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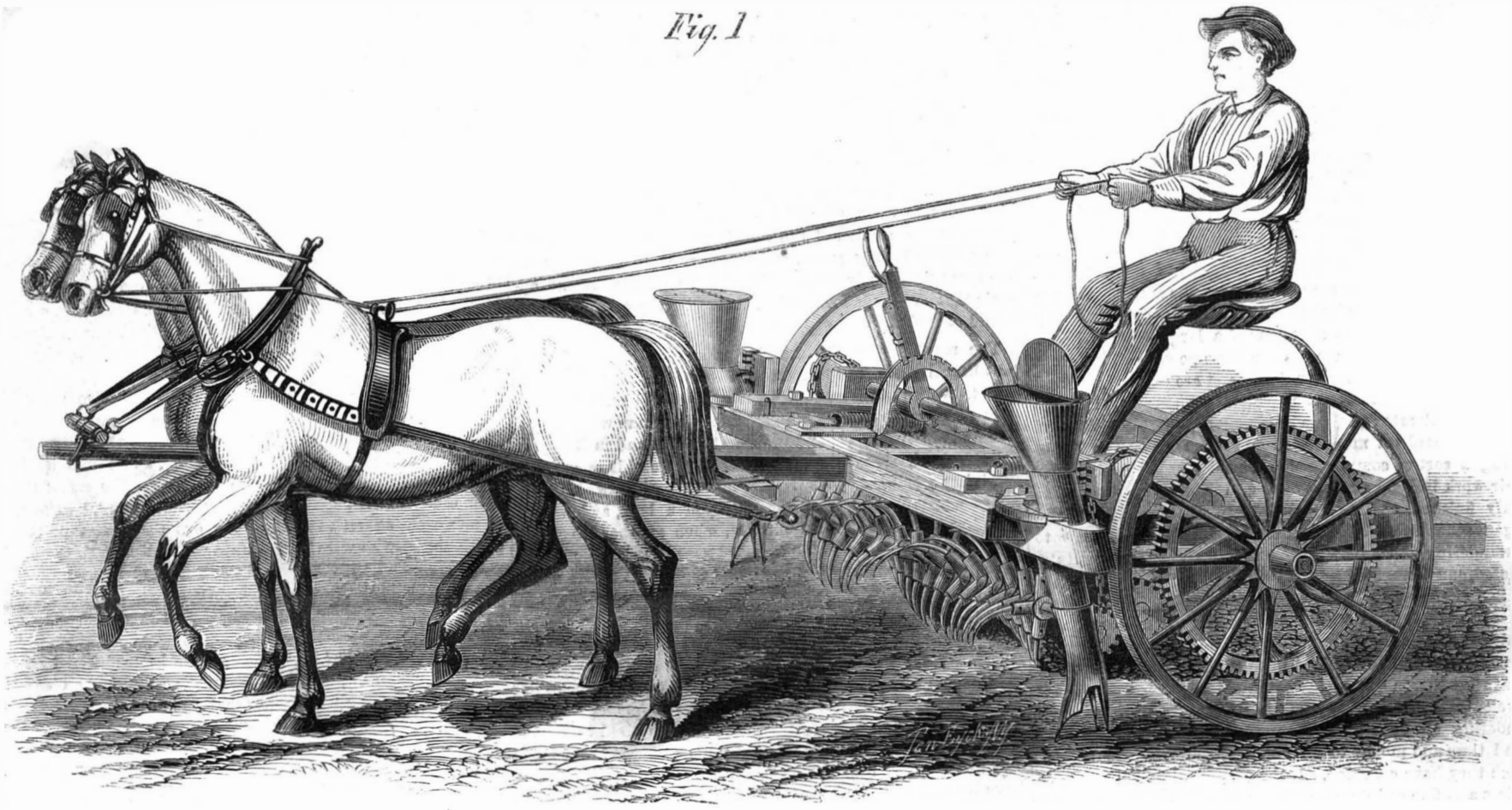
**Improved Device for Loosening and Pulverizing Soil.**

It is well known to farmers—those at least who endeavor to understand the science of their business—that although the soil holds a certain proportion of the nutritious elements which form the constituents of plants, their roots as well as their leaves and blossoms, depend greatly upon the elements of the atmosphere for growth and development. Consequently the exposure of the soil to the atmosphere is a necessity in agriculture. But often its exposure is simply a reversal of the position of the soil, what was at the surface being placed at the bottom of a furrow from four to ten inches deep, that bottom being compressed hard by the weight and friction of

*Fig. 1*



STELLE'S COMBINED CULTIVATOR AND PLANTER.

the plow sole. Pulverizing, not breaking into masses, is what the soil needs to enable it to receive from the atmosphere and return to the agriculturist the greatest amount of good.

The object of the machine seen in the engravings is to save labor and time while it pulverizes the soil better than any other device. It will cultivate a space four feet wide, plowing and harrowing it ready for the reception of the seed, while the ordinary plow simply turns the soil upside down in a furrow of about nine inches in width. This machine pulverizes the soil to a depth of from one to ten or more inches. The teeth of the cylinder are placed in a spiral around the shaft, so that only four or five of them are in the same degree of contact with the soil at one time, making the draft very light, especially as the cylinder revolves in the direction of the draft.

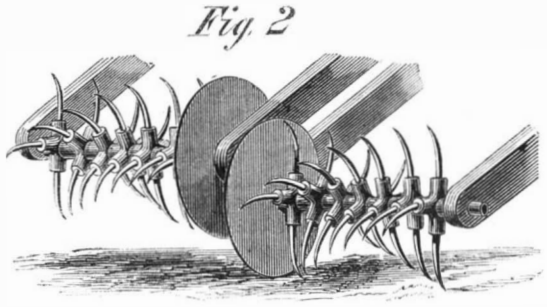
The teeth may be made of any required form, harpoon-shaped, diverging from the hub, enlarged at the end with square or round edges, etc., to suit the work required and the nature of the soil.

Attached to the sides of the machine are two receptacles for corn or other seed placed directly in front of the wheels, which may have attached to their peripheries broad pieces to compress the soil above each hill, or the tread of the wheels may be made broad enough to act to the same purpose. Cut-offs similar to those used on a common shot pouch are actuated by a double cam on the main or driving shaft. The upper cut-offs may be adjusted so as to permit few or many kernels to fall at one time. The driving wheels being about four feet in diameter, describe a distance in traveling one revolution, of about twelve feet, and by the double cams operating the seed-feeding cut-offs, deposit three hills to one revolution of the driving wheels. The operation of the seed planter may be suspended at will, so that the machine may be used only as a plow, cultivator, or pulverizer of the soil. When it is required to loosen the soil only to the depth of three or four inches, the gear may be used, the cultivating, cylinder in that case making nearly three revolutions to one of the driving shaft; but when it is necessary to open the soil to a depth of from ten to fifteen inches the cylinder may be thrown out of gear.

A lever and quadrant in front of the driver's seat is used either to regulate the depth of action of the cultivator teeth, or to raise them from the ground a distance of from six to eight inches for driving over common roads to and from the place of labor. The lever operates the cylinder by means of chains and cams on the lever shaft at each end of the machine.

Fig. 2 represents a corn or other cultivator composed of two separate cylinders, with flanges at the inner ends, intended to protect the plant from dirt and to enable the operator to guide the implement. The action of this machine leaves the soil in better condition for drainage and better suited for the growth of crops than the ordinary plow and harrow. It was patented through the Scientific American Patent Agency, July 16, 1867, by D. D. Stelle, assignor to himself and Thomas

*Fig. 2*



E. McDonald, of New Brunswick, N. J. Patents have also been secured through this office in England and France. Applications for the purchase of rights etc., may be made to Johnson Letson, New Brunswick, N. J.

**Process for Preserving Wood.**

A recent patent granted to Sigismund Beer, of New York city, is as follows:

"Wood freshly cut is full of sap, composed of hygroscopic and very perishable organic substances. Heretofore, the idea has been, in seasoning and preserving wood, to wash out these substances, or to chemically combine and convert them into more durable compounds. Washing by steam only removes matter having great affinity for water, and soluble therein, leaving those that coagulate by the action of steam to fill the pores and stop further action. The chemical conversion of these substances is commonly produced by metallic salts, which combine with them, forming insoluble compounds of more durability. But this action is necessarily limited to the exterior, as deep impregnation is stopped by the newly formed products. Moreover, the cost is high, and the salts more or less injuriously affect the wood substance.

"My discovery consists in simply treating the wood with a boiling solution of borax in water, which easily and effectually dissolves and removes all those perishable substances, without injuriously affecting the wood fiber, which, on the contrary, becomes harder, impregnable to water, vermin proof, perfectly indifferent to the moisture or dryness of the atmosphere, and almost incombustible.

"The process and operation are as follows: In a tank, of wood or iron, I prepare a saturated or nearly saturated solution of borax in water, sufficient to cover the wood. I then raise the temperature, by steam or otherwise, to the boiling point, and keep it there from two to twelve hours, according to the porosity and thickness of the wood. I then repeat this operation in a freshly-concentrated solution of borax in water, but immersing the wood only half as long as before. The wood is then taken out, and, as soon as dry, it is ready for use, if its hardness and discolor are not objectionable, or it may be several times washed in boiling water, which will extract the absorbed borax in connection with the colored matter, and restore its former color and appearance, more or less, at will.

"It is not necessary to use a very strong solution, but I prefer it on account of the facility for re-using it.

"Simple as my process is, it may be advantageously altered in some cases. When thick lumbers are to be treated, it is well to steam them thoroughly in the ordinary way, and place them in the tank while still warm and wet. The denser and heavier liquid of borax solution will more quickly penetrate the pores of the wood, and shorten the operation considerably.

"If it be desirable to impregnate the wood with tar, coal-oil, or like substances, they are easily applied, after the wood has been thoroughly dried.

"If it be desirable to make the wood perfectly water-tight, shellac, or other gums, or resin, or substance soluble in a boiling solution of borax, and insoluble, after drying, in cold water, may be added to the liquid of the second operation."

THE DUROMETER.—At the Paris Exposition an instrument was exhibited designed for testing the relative hardness of steel rails. This "durometer," as it is styled, is virtually a small drilling machine, working by hand or machine power, which registers the number of revolutions of the drill spindle and also the amount of feed, the latter being given by the application of a known weight to the back of the drill spindle. The friction of the machine and the state of the cutting edges are supposed to be constant quantities and as such are thrown out of the calculation. The hardness of any rail is considered to be inversely proportionate to the depth of feed obtained with a given number of revolutions.

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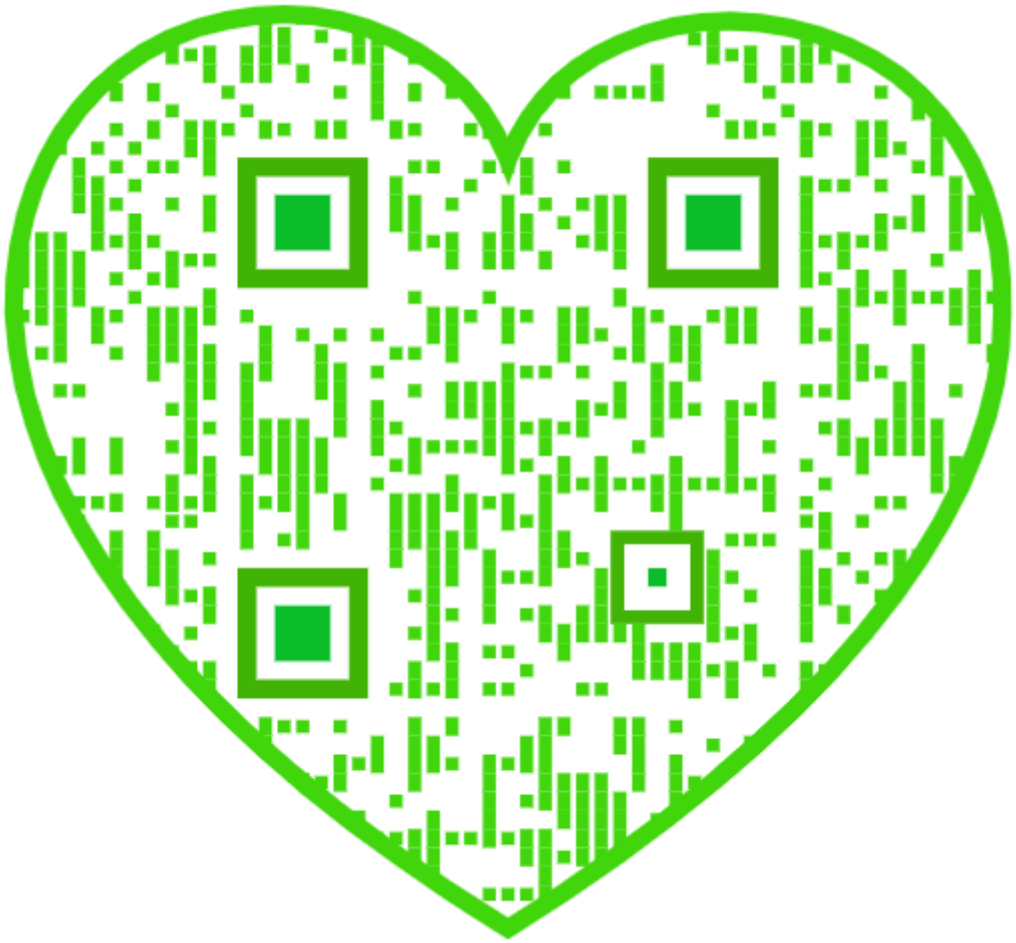

## EDITORIAL CORRESPONDENCE.

*Affairs in Italy—Priests and Monks—Rich Monasteries and Churches—Artists—Machinery—Mosaics—Laurentian Library—Trip to Naples via Rome.*

NAPLES, Jan. 28, 1868.

The recent troubles in Italy that so much agitated the whole surface of European politics have pretty much subsided, but the calm has in it a portent of evil, and it is impossible to feel any degree of security for the future of this people, who seem determined to carry forward the work of uniting Italy under one government. Nine years ago the French Emperor at Magenta, Solferino, and Montibello gave powerful aid toward the unity of Italy, and the work has since been going forward with the slow healing process of a fractured limb, and might have been complete at this moment but for the intermeddling of this same French Emperor. So long as he thrusts himself in the way, to check the wishes of the Italians, so long will Italy be afflicted with political and social upheavals.

There are still great apprehensions of trouble in Italy. The people are fretting impatiently under the check which has been put upon their hopes, and it is with the utmost difficulty that Victor Emanuel, who is much more of a bluff soldier than a shrewd politician, has been able to keep his crown. He is now unpopular in Italy simply, I believe, for the reason that he has not been able to lead the people to a full realization of their wishes.

I had a curiosity to visit the Parliament now sitting at Florence. There was a simplicity about the proceedings which made it seem like our own "Republican Court." No pomp, no show, no ceremony. A very spirited debate was going on—one of the members was charging the Ministry face to face with having palmed off upon the people some falsified documents, for the purpose of misleading them, and though called to order by the presiding officer, who vigorously rang his tea bell, the member insisted upon his right to speak, and in this he was sustained by a majority of the members. It was charming to notice with what apparent freedom members gave utterance to their views of public policy, an evidence that some of the fire of ancient Italy still burns.

It is impossible not to see and feel that the church of Rome, so much venerated for its history and antiquity, is gradually losing its hold upon the affections of a large class of its believers. The priests have not the same power and influence over the masses as in former times, and are even caricatured in public prints, an irreverence which I am assured would not have been tolerated until quite recently, and no one can look upon the horde of monks that traverse the streets without feeling a sort of commiseration for their unhappy situation. Their work in Italy and elsewhere in Europe appears to be nearly finished, their extensive monasteries, cloisters, and elegant chapels are almost deserted, and they seem now to be wandering about the streets and solitary places, destitute, afflicted, and tormented.

Some of the magnificent church edifices in Italy, as in Spain and elsewhere, with their rich marbles, decorations, and master works in sculpture, painting, and fresco, are monuments of the skill and refined taste of these monks, and will always constitute one of the chief objects of interest to all travelers. Some persons seem to delight in abusing these wandering children of the church, but they are glad to spend time and money to see and admire the wonders of art which they have collected. If the ecclesiastical and monastic edifices and fine scriptural pictures could be suddenly swept away from Italy, much of the interest which now clings to it would disappear, for with rare exceptions a mere, shapeless mass of ruins and the associations of ancient history, are of comparatively little interest except to antiquarians, scholars, and minds well instructed in historical reading.

The people of Italy at this moment are reduced to the straits of a paper currency, and even individual shinplasters, for the want of small change, pass current in the cities. Gold now commands a premium of fifteen per cent, and coppers six per cent, yet with the exception of the necessaries of life, which are now higher than at any former period, the price of labor and merchandize remain about the same. The business of the country is heavily depressed, but the Italian who wishes to pass for a gentleman upon the Lung Arno or the Corso must contrive in some way to sport his fine stovepipe hat, also a seat at the opera where his "bravos" can be energetically rendered, and if possible a fine equipage, even though he must needs go without his dinner and live at his home in squalid discomfort.

The Italian always has his house, however humble, but he spends a good deal of his time in loitering about the promenades and cafés, though he never frequents the hotel; therefore spacious bar-rooms are never seen in them, and when rents are high the hotel, even with plenty of rooms at three and five francs per day, may remain empty. The hotels are for travelers, not for residents. Bar room tippling, the curse of our own country, is a thing almost unknown in Italy. I was informed by a resident that there was but one establishment in Florence where a gentleman could go up to the bar and obtain a prepared drink, such as are furnished at every bar-room in New York. Drunkenness, as we so well understand it, is also a thing unknown, and the records of crime and immorality indicate a better state of society than is found in either English or American cities.

The charitable institutions of Florence are numerous and well cared for. One of the most ancient is the *Misericordia*, founded many centuries ago by the aid of a fund collected as fines for profane swearing, imposed upon themselves by workmen employed in the extensive cloth factories which at one time were quite numerous in Florence. Forty men are on duty all the time, and at the monotonous toll of the great cathedral bell they go forth on their mission of mercy, masked and clothed in a black monastic dress, and bring to the institution the sick poor, or those who have been wounded to afford them succor, or when killed, a Christian burial. They understand the language of the tolling bell as well as our firemen do when summoned to their duty. I noticed when a procession of the *misericordia* passed through the streets that citizens lifted their hats and soldiers presented arms, in token of respect to the society, which has a long and humane history of noble deeds.

Artists in Italy are poorly paid, and works of art can be purchased very cheaply. I noticed in one of the public galleries an artist at work, skillfully copying some exquisite little pictures. I had the curiosity to learn how much he was paid for his labor. He gave me the price of the picture and the time required to finish it, and I found that he was earning about five francs per day, out of which he had himself to support. Noticing upon the walls of the gallery an elaborate picture of the "Adoration of the Wise Men," painted by one of Italy's old masters, I inquired of the artist his charge for making a copy of it; he replied, twelve hundred francs, which meant paper money, and moreover he assured me that to do it well would occupy his time the best part of a year. With a view to verify the correctness of the estimate, I took the trouble to make the same inquiry of another artist of considerable reputation, and he informed me that he could not undertake to complete the copy short of nine months time and at five times the price previously given by the other artist. There are nearly a thousand artists in Florence—sculptors and painters—a great majority of whom eke out a beggarly existence. Visitors to the galleries of art are besieged by the importunities of these people to buy their works, and they even beg permission to fetch them to your lodgings. They also operate through servants to secure, if possible, admittance, hoping thereby to dispose of their productions. Bargaining is the rule throughout all Italy, so far as my observation extends, and the purchaser can usually fix his own price upon all articles of handicraft. The contrast between the condition of the working classes here and in our own country is very great, and beggary is so common that one must necessarily harden his heart to all the piteous appeals that are made for charity, otherwise the cost of giving would exceed the cost of traveling.

The manufacture of Florentine mosaics is still an important branch of industry and requires the greatest degree of skill to work the pieces into so many fanciful and exquisite forms. The slab usually employed for the frame work of the mosaic is known as the "paragon stone," found in Belgium and Scotland. It is black and very dense, and is capable of receiving a brilliant polish. The holes are all sawed by the use of a small steel wire, strung upon a bow, and which lasts but from three to five minutes, when another length is required. The pieces to be inserted are of various natural colors, selected with great care, and are all cut in the same way to an exact measurement, the process being exceedingly slow and tedious. After the sawing, the small pieces are fitted into the matrices according to a design previously prepared, and are then secured to their places by a tough cement, the whole resting upon an under slab of slate. The mosaic is finished by polishing the surface by hand, by means of porphyry. A month's time is frequently required to polish a fine table top. In the king's palace is a mosaic table that cost the labor of fourteen years, and the expense is said to have been $200,000. It was made at the government works, for the London Exhibition of 1851. A costly toy, to be sure, but foreign governments don't mind the expense, so long as they can wring the money from the people. There still exists in Italy a strong prejudice against the introduction of labor saving machinery. Mechanics here cherish the crude old notion that machinery would destroy the value of their labor instead of enhancing its dignity and increasing its demands; therefore they are content to plod on day after day, through weary manipulations, which could be performed much more profitably by a machine. I was informed by an American residing in Florence, that it would not be safe for any one to introduce a circular saw, therefore boards and all other pieces of lumber are ripped by an old fashioned slitting saw, worked by two men. Of modern agricultural machinery little or none is employed, and all attempts to improve the quality of the silk-worm have failed mainly through the opposition of those who insist upon carrying on the operations of the worm in their own houses. I cannot conceive of a better and more humane service to be done for the advancement of the working classes of Italy, than to instruct them in the proper use of improved tools and processes, and to convince them that by their use great benefits would result therefrom. People in Italy have no fires in their places of business, and it is often considered a luxury to have a fire in their houses; beside, the fireplaces are constructed so deep that the heat all goes up chimney, and very little comfort is derived from it. The people warm themselves by the use of an earthern jar or pot, with a few embers in it, which they carry about by a fixed bail or handle. The jar, often highly ornamented, is about the size of a small flower pot, and it is amusing to see the people huddling over them trying to keep their fingers warm.

In my last letter, I spoke of the many fine church edifices of Florence, but neglected to state that although elegantly fitted up few of them have finished fronts—a serious defect that was explained to me as resulting from the circumstance that in earlier times a heavy tax was laid upon all finished churches, therefore to avoid this tax the front was left in a rough state. Some of the most splendid churches in the city present this singular contrast—externally, a rough stone wall, or a plain stuccoed front; the interior finely painted, gilded, and otherwise adorned.

The Laurentian Library, connected with the church and old monastery of San Lorenzo, contains one of the richest collections of rare manuscripts to be found in the world. They are solidly bound, and each volume is fastened to the desk by a heavy iron chain. Here are to be seen the Pandects of Justinian, captured at Amalfi seven hundred years ago, also manuscripts of Tacitus, Virgil, Horace, Petrarch, Dante, Cicero's Epistles, and many other classical works; also, a copy of the famous Decameron of Boccacio, dated 1381, a book that greatly interested me, because of a statement I noticed in an English paper to the effect that in 1812 a copy of the Decameron was purchased at an auction sale in London, by the Marquis of Blandford, for the sum of £2,250, and that upon his death it was bought by his early rival for the book, Lord Spencer, for £918. The journal furthermore declared that only two other copies were known to exist, one in the Ambrosian Library at Milan, the other in the Imperial Library at Paris. It seems, however, that there is a Decameron at Florence, and if I remember rightly, it bears an earlier date than that purchased by the Marquis.

But I must not linger in Florence; the eruption of Vesuvius demands our presence at Naples. We took our departure on a dark, rainy night, with the expectation of getting an outside view of Rome at an early hour in the morning. About an hour before we reached the "Eternal City," a pontifical officer took our passports, in return for which we were handed a receipt, with the assurance that before leaving the state the passports would be returned. We had a distant view of the dome of St Peters, and for several miles on our way to Naples, we rode along the Campagna and very near to the broken arches of the famous Claudian aqueduct, and numberless scattered piles of stone, which brought back a faint idea of a ruined city, once the mistress of the world. After a tedious ride of eight hours, we were set down in the suburbs of Naples, in a pelting rain storm, and became the prey of a pack of hackmen and runners, who seemed anxious to devour us, bag and baggage.

S. H. W.

P. S.—Just as I was about to close this letter, Naples was thrown into an intense excitement by a very shocking calamity, the full extent of which it is now impossible to ascertain. It appears, that, about six o'clock this evening, a considerable portion of an abrupt hill, called the Piazzo Falcone, which rises high above a principal and much frequented street, that runs along the bay side of the city, suddenly gave way, overwhelming a public-house, beside several dwellings and shops, also burying in its ruins a large number of people. I have just returned from the scene of the disaster, about five minutes' walk from the hotel, and found an immense pile of earth and rubbish filling up the street for a long distance. A force of soldiers were on guard, and gangs of men were at work trying to dig out the bodies of those unfortunates who were buried under the ruin.

I understand that Bayard Taylor resided in one of the houses which was destroyed, but, fortunately, he with his family were temporarily absent when the catastrophe occurred.

During the past ten days Naples has been visited by two severe rain storms; and, one night, the shock of an earthquake was sensibly felt throughout the city, which will no doubt account for this land slide.

Vesuvius, to-night, is more splendid than at any time since this eruption began. The discharge of the lava is increasing, and the surface of the cone toward Naples is almost entirely covered with the red hot mass, which now flows down through seven distinct streams.

W.

### Anthracite Gunpowder.

Ehrhardt, of London, has lately obtained as above. "The powder is composed of nitrate of potash and chlorate of potash mixed in proper proportions with mineral carbon Powder thus compounded is less liable to accidental explosion, inasmuch as it does not explode when ignited in the open air, but burns slowly, something like common gunpowder when wet. But when confined, as in a gun, or in a blasting hole in a rock, it explodes with even greater force than ordinary gunpowder. It is not much affected by dampness, and generates but little smoke in burning.

"To make this powder, the several ingredients must be finely pulverized and then intimately mixed together. The more finely they are pulverized the better. They require no other preparation. When the ingredients are well mixed the powder is ready for use. The proportions of the ingredients may be varied for different kinds of work. For use in coal mines, I prefer to take one part by bulk of chlorate of potash, four parts of nitrate of potash, and five parts of mineral coal. For blasting granite or other hard rocks, I prefer to take one part of chlorate of potash, two parts of nitrate of potash, and three parts of mineral carbon.

"The mineral carbon may be either bituminous coal or anthracite, but I prefer to use the anthracite known as "red ash." Wood charcoal may be used instead of mineral coal, but it is not so good. Nitrate of soda may also be used in place of the nitrate of potash."

### Improvement in Generating Illuminating Gas.

Ferdinand King, of Richmond, Va., who has lately obtained a patent, says:—"I take of the oil that runs from the gas tar produced at gas or coke works about two parts, and crude petroleum about one part, and mix them together, forming a compound oil. From this compound oil I generate gas by treating it in any oil-gas generator, in the same way that other oils are treated for the same purpose. It makes a superior illuminating gas, at a very small expense, and will be found of great value for lighting private houses and single buildings or establishments which cannot be supplied by public gas works."

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## Correspondence.

*The Editors are not responsible for the opinions expressed by their correspondents.*

### Spiders--Their Habits and Peculiarities.

MESSRS. EDITORS:—Spiders find their way into the tidiest places, an axiom verified by their having found a nook in your columns; before you brush them down, however, allow us to tell "all we know about them." I think a study of the habits and peculiarities of the spider an interesting one, proving both useful and instructive. We find its web counterfeited in the fisherman's seine, its spinerets have mechanical counterparts in our threadworks, and we mimic it in bridging rivers and chasms with our suspension bridges—first one frail wire, then another, and so on until the fairy-like structure is completed. To those who fail to see how observations of the habits of these and other insects can prove useful, I will cite the case of the French commander before Utrecht, who, discouraged by the incessant rain and drizzle, was upon the point of abandoning the siege of that city, when Disjonval dissuaded him, saying that he had noticed more than ordinary activity on the part of a spider, which led him to expect a change soon. It turned out as Disjonval predicted, and Utrecht fell! How important an event dangled on the thread of that spider! Mr. Eades, in your third February number, gives an account, in his observations, of a species of flying spiders. I find that Darwin terms them "gossamer spiders," and mentions that while on a ship that was sixty miles from shore, in the direction of a steady though light breeze, vast numbers of these spiders covered the rigging of the ship. Dallas, in his "Animal Kingdom," says of spiders, "that many of them have the faculty of emitting long threads, one end of which floats freely in the air until it meets with some object to which it adheres. By this means spiders form natural bridges by which they pass over brooks and ditches. Some species avail themselves of this power to take flights in the air, where they attain great altitudes." The most casual observer must have noticed how easily the ordinary or geometric spider crosses areas and alleys by means of a single thread having a bunch of a filmy, adhesive nature at its end, to buoy it up until it reaches an opposing object to which it adheres.

Several years ago, while on the "look-out" of one of our large elevators, I noticed a plump spider fall upon the metal roof beneath me, and a wasp darting after it, immediately secured it in a sort of basket formed by its legs, and then flew off with its prize. The question now was, what use has the wasp for the spider? The next season following gave me an opportunity of solving it. Noticing several wasps about some dingy windows in an area, I concluded to watch them, and soon had the satisfaction of seeing a few depart with their game. I traced their destination, and found it to be a number of clay structures under the eaves of a neighboring dwelling. These formations had numerous perforations, about which the wasps busied themselves. Some time after they had abandoned the neighborhood, I gained admittance to the house and removed several of these adobe nests. I opened one of them and found a cell containing an egg or larvæ; the cell beside it was filled with spiders in a torpid state, both great and small, packed closely, with their front legs turned over their backs. The same order of arrangement was observed in the balance of the nest. I came to the conclusion that the spiders were placed there to keep a necessary temperature for the larvæ. I was not satisfied, however, and began a search among various authors, until Darwin, in his "Researches," set me right, by describing "certain wasp-like insects which construct in the corners of verandahs, clay cells for their larvæ. These cells they stuff full of half-dead spiders and caterpillers, which they seem wonderfully to know how to sting to that degree as to leave them paralyzed until their eggs are hatched, and the larvæ feed on this horrid mass of powerless, half-killed victims." I might go on and relate instances of the courage and ingenuity of the garden spider, but a fear that I am encroaching on your valuable space forbids it. I will close by giving another instance of the usefulness of observations of insect life. A Scotch mathematician, in measuring the angles of a bee cell, discovered an error in a table of logarithms sufficiently great to have occasioned the loss of a ship at sea, whose captain happened to use a copy of the same logarithmic tables for calculating his longitude." H. W. BLEYER.

Buffalo, N. Y.

### More about Suction Pumps.

MESSRS. EDITORS:—On page 67, Vol. XVIII., your correspondent endeavors to place some strictures upon my statements in a former communication. He says, that "the pressure on any valve is just the same when in the pump at work as when out of the pump—that is, equal on all sides. If this were so, the valve would never move at all; for, as in the case of any other body, there being an equilibrium of the forces acting upon it, it would necessarily remain at rest. But I maintain that it is pressed downward with just the force required to raise it, and that the pressure is proportional to the area of the valve (or piston, if that be considered), multiplied by its perpendicular hight above the surface of the water in the well. As to the water being sustained, he cannot note my language very carefully, or else he would perceive that I do not say what force sustains the water in the 'feed pipe,' but only that there is pressure on the valves, and that the water is sustained. But I will now say that the water is both sustained and raised through the agency of the valves, for without them neither would be done. I will endeavor also to show the amount of pressure on any valve. First, the pressure on the surface of water exposed to the atmosphere is the weight of the atmosphere, an amount varying slightly with atmospheric changes, and considerably with the hight or distance of such surface from the center of the earth, and ascertained to be fifteen pounds per square inch at the level of the sea.

Suppose a straight tube of sufficient length, open at both ends, fixed perpendicularly in a well, with its lower end below the surface of the water, and that a piston within it, and movable through its whole length, be placed exactly at the surface of the water, and then moved upward. As the piston is raised, it carries with it, and above it, the weight of the atmosphere on its upper surface, which weight would otherwise rest on the surface of the water inside the tube; and this weight being removed, the pressure of the atmosphere on the water outside the tube forces it to follow the piston upwards. Now, suppose the area of the piston to be one square inch, and the hight to which water can be raised in this way to be 33 feet, or 396 inches, then it is plain, that, in the beginning, or when the lower surface of the piston is level with the surface of the water outside the tube, the upward pressure of the water upon the piston is just 15 pounds. When the piston is 33 feet above the surface, the atmospheric pressure sustains a column of water at the same hight, or 3 cubic inches of water, while it imparts no pressure to the lower surface of the piston, inasmuch as the water will follow it no further. From this it will also be seen, that, for every inch the piston rises, the pressure on its lower surface is diminished by $\frac{1}{396}$ of 15 pounds. Hence, the aggregate pressure on the piston, at any point, may be found by taking the constant downward pressure of 15 pounds (15 pounds to every square inch of surface in any other case), and subtracting therefrom such a fractional part of 15 pounds as its hight lacks of 33 feet; in other words, the sum of these two opposite effects of atmospheric pressure is a downward pressure, varying exactly as its hight. The same is true of the valves, valve-boxes, and pistons of suction pumps, applicable to the upper valve when ascending, and to the lower one when the upper one is descending, or to either when closed; and the amount of pressure obtained by this rule, plus the force necessary to overcome the inertia of the mass to be moved, together with the friction of the water, and that of the piston against the sides of the tube, will be the force to be applied to the piston in order to move it upwards and raise the water to its own hight.

As to your correspondent's criticism on the word "generally," I would say that the word was used as the word *general* is, when we speak of a general rule, meaning one of general application, or true in all cases to which it is applicable.

Now for the friction question. The friction of the water, other things being equal, will be in proportion to the surface of the containing solids passed over by it. Suppose two tubes, one having an area of cross section of one square inch, and the other of four square inches, with equal pumps attached. If the water in the larger tube must move five inches to deliver a certain quantity of water, that in the smaller must move four times as far, or twenty inches, to deliver an equal quantity. The surface passed over in the first case is the inside of a tube 5 inches in length, whose area of cross section is four square inches. The surface passed over in the second case is the inside of a tube 20 inches long, with an area of cross section of one square inch. The first is $\sqrt{.07958} \times 5 = \sqrt{.\frac{1}{07958}}$ square inches for the larger tube. The second is $\sqrt{.07958} \times 20 = \sqrt{.\frac{400}{07958}}$ square inches for the smaller tube.

These, it will be seen, are to each other as $\sqrt{1}$ to $\sqrt{4}$, or 1:2, thus proving the amount of friction from passing over a larger surface, to be twice as great in the smaller as in the larger tube. It will be seen further, from the above, that the amount of friction from the cause named varies inversely as the square roots of the areas of the cross sections of the tubes. Hence, it is easy to see that the relative size of pumps and feed pipes is a question of considerable importance on account of the friction of the water, especially where it is to be carried over long distances, and raised to considerable hights.

Oneida, N. Y. M. N. HORTON.

### Carbonic Acid Gas in Wells.

MESSRS. EDITORS:—To relieve wells or other vertical excavations of damp, or carbonic acid gas, or the smoke of gunpowder in blasting, make a hoop of any flexible material of sufficient weight (a grape vine answers well), nearly the size of the excavation. With a coarse blanket or any other strong cloth make a bag five or six feet long; sew the hoop in the open end, so as to keep the bag distended. Tie a rope across the hoop, and attach to the center of it a long rope, which will reach to the bottom of the well. Hold the bag so that the distended or open end will descend first. Let it drop, and it immediately becomes inflated with air, which is carried to the bottom, and displaces the impure air. A few repetitions of the fall of the bag render the air at the bottom entirely pure. J. M. W.

Seguin, Texas.

### Ships' Pumps Done Away With.

MESSRS. EDITORS:—I saw in your issue of Feb. 15th an article headed "Ships' Pumps Done Away With." I used something like it in 1862, on the lower Ohio, by boring a hole in the bottom of a flatboat and inserting a gooseneck pipe. As long as the boat was under headway the water would run out, but as soon as the headway stopped the water would come back. I thought at the time that a boat in a four or five mile current would be kept free of water in this way. It was no invention of mine, as I heard it spoken of fifteen years, ago, and it is an old story to flatboat and steamboat men of the West. A STEAMBOAT MAN.

### Transmission of Power for Long Distances.

MESSRS. EDITORS:—On pages 98 and 99 of Vol. XVII, there is an article from your special correspondent giving a description of a method used at Schaffhausen, for transmitting water power for a very long distance, and, as he remarks, it is a matter of great importance. The article has doubtless been read by thousands with as much interest as I felt in perusing it. The plan he describes has, however, been tried in this country with but indifferent success. In attempting to convey power two hundred feet, I first tried a hemp rope one and one-eighth inches diameter, then a manilla rope, and lastly a hide rope, all with the same success; they all three wore out in about a year, when they wore off the strands on the inside of the rope. The continual working and bending seemed to cut the inside strands
to be comparatively perfect. An attempt to splice them entirely failed.

Now will wire rope be any more durable? In my experiment the pulleys used were six feet in diameter making one hundred revolutions. It is not always practical to support a shaft for a long distance. I have had many years' experience in manufacturing, using both water and steam as power, yet I have not been able to arrive at a fixed conclusion which is the best means of conveying power for long distances—shafting or belts—and I find a great diversity of opinion among mechanics on this subject. M. J. W.

Champlain, N. Y.

### Polygons.

MESSRS. EDITORS:—One of your correspondents, page 410, Vol. XVII., wants a theoretical demonstration that the side of the regular heptagon inscribed in a circle is equal to half the side of the inscribed equilateral triangle. This demonstration cannot be given, as it is not strictly true. For the radius=1, the side of the heptagon is equal to twice the sine of one fourteenth of 360°, or twice the sine of 25° 42′ 51″, which is equal to 0·4339; half the side of the triangle is equal to $\frac{1}{2}\sqrt{3}$, or 0·4335; the difference of these two numbers is so small that in common practice one can be used for the other, but they are not absolutely equal, and hence the impossibility of demonstrating this equality. Only in cases where the equality is absolute, demonstrations are possible. There are many other rules for constructing polygons of an odd number of sides, but as they are only approximate, no demonstration can be given. So is one-third of the diameter only a little smaller than the polygon of nine sides; seven twelfths of the radius very little larger than that of eleven sides; one-quarter of the radius nearly equal to that of twenty-five sides, etc. P. H. VANDER WEYDE, M. D.

### Hardening Mill Picks.

MESSRS. EDITORS:—On page 103, current volume, in publishing my reply to "L D. M.," on hardening mill picks, you make me say, "cool the picks in the bath, and drawn to temper." It should be "draw no temper." The salt gives hardness, and the other ingredients toughness to the steel; and they will not break, if they are left without drawing the temper. S. H. B.

### A Formidable Prussian Iron-Clad.

About three years ago the Turkish Government contracted with Mr. Reed, of the Thames Iron Works, in London, to build an iron-clad, larger, stronger, faster, and more powerful, than any vessel of her kind. The work was begun, but after a while the Turkish remittances failed, and Mr. Reed was obliged to look about for another purchaser of his vessel. The Prussian Government quickly accepted the offer, and the work went on to completion.

The vessel has just been finished at London. She is called the *King William*, is of 6,000 tuns burden, draws 26 feet of water, and carries 8-inch armor, with a battery of 26 300-pounders, all of Krupp's steel, all breech-loaders, and capable, it is said, of being fired with 75-pound charges as often as twice in a minute. Her engines can be worked up to 7,000-horse power, and she can make fourteen knots an hour.

She is constructed on what is called the longitudinal system, that is, a series of most powerful wrought-iron girders, or frames, laid at a distance of seven feet apart, and passing along her completely from stem to stern. Between these the wrought-iron ribs are bolted, below the water line, at intervals of four feet apart, but above it, and behind the armor they are bolted as close as to within two feet of each other. Within both frames and ribs comes another iron skin an inch thick, so as to literally make a double ship, the inner one being four and a half feet apart from the outer.

Side passages, or wings as they are called, running the whole length of the structure, continue this double form up to the main deck. The inner side of these wings form the sides of the coal bunkers, so that even were it possible for a shot to pass through the armored sides of the *King William*, it would still have to penetrate the iron coal bunkers and pass through eight feet of coal before it could do any mischief to the fighting crew of the ship. She is ship rigged and will carry a crew of 700 men. She cost $2,000,000.

PEACHES WITHOUT STONES.—An agriculturist has, it is said, tried with success the following method of making peaches grow without stones: "Turn the tops of the trees down, cut off the ends, stick them into the ground, and fasten them so with stakes; in a year or two those tops will take root, and when well rooted cut off the branches connecting these reversed and rooted branches with the tree proper, and this reversed peach tree will produce fine peaches without stones." The same experiment may be tried with plums, cherries, and currants.

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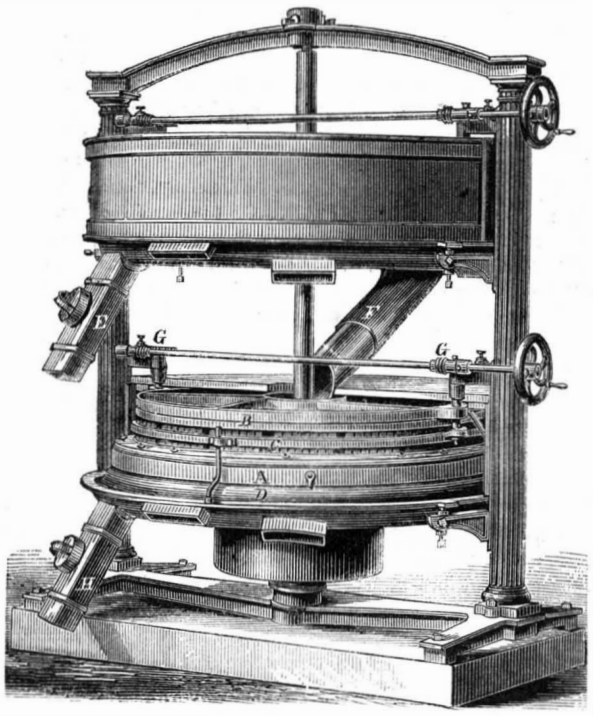
## CLARK & ELTING'S "EXCELSIOR" BOLT AND DUSTER.

This machine, of which the engraving is a representation, is designed by the inventors to supply a want long felt by the milling fraternity, viz., a machine which will extract the flour from middlings as well as bran, and at the same time allow the flour so extracted, or at least a large portion of it, to pass into the best grade of flour; in other words, a machine, which will increase the yield without injuring in the least the quality.

That the Clark & Elting machine accomplishes this result, the testimony of such mills as the celebrated "Passaic," of Newark, N. J., the "Pearl," of Pittsburgh, the "Star and Crescent," of Chicago, the "Plants," of St. Louis, the "Boston City," of Boston, and many others of equal reputation, bear ample witness. In the accompanying engraving half of the lower casing or curb is removed, in order that the working of the machine may be more fully shown.

The machine is constructed with revolving horizontal disks, A, covered with wire cloth, varying from 36 to 44 inches in diameter, and having two or three disks as may be deemed advisable, with a view to the work to be done. Above these revolving disks are stationary ones, B, filled with long bristles of the very best description. Surrounding these bristles, and among the openings or furrows of the stationary disks, is what is termed a tempering wheel, C, the object of which is to virtually shorten or lengthen the bristles, as the work to be performed may require. Attached to the under side of the revolving disk are fans, which run in an air chamber, D. These fans form a suction, whereby the flour is drawn through the revolving disk, and conducted into the air chamber, where it passes off through the spout, E, and is carried to its proper place to be rebolted.




The brace and middlings pass off between the disks, by centrifugal force at the periphery, and so are reconducted by the spout, F, to the eye of the lower disk, that the same operation may be repeated. The disks are arranged in such a manner that by means of worms and screws, G, they may be adjusted at will while the machine is in motion. Thus the machine is under the control of the miller to just the same extent as the millstone.

The meal is taken from the return reel at the point where it begins to show specks (the main object being not to return any specks to the superfine reel), and is carried into the eye of the first disk, which is so set as to clean the stuff all it will bear, to run into the best flour.

The tailings of this disk are then returned to the next disk, by the spout, F, and the same operation repeated, and so on to the third disk, if a three-disk machine is used, and the tailings from the last disk are carried to a separating reel, by the spout, H, where the division of middlings, shorts, and bran, is made. By this operation, it will be discovered, that not only the quantity of the best flour will be increased, the color improved, greater clearness obtained, but that the amount of middlings to be reground will be materially lessened.

The middlings to be reground will be sharper, rounder, and cleaner, than it is possible to make them with bolting cloth. And it will be discovered that the same number of bolting reels will do more work than by the previous method; since the removal at once of the middlings frees the cloth, and prevents the particles which before were being worked over and over, from being returned to accumulate.

The machine was patented through the Scientific American Patent Agency, February 12, 1861, and is now in successful operation in over three hundred of the principal flour mills of the country. It was brought to its present perfected condition by the Elting Bolt & Duster Company, of Cincinnati, the sole manufacturers of the machines and owners of the patent, to whom all communications should be addressed.

A CORRESPONDENT recently returned from the East says:—"In Turkey, in Asia, the only mode of measuring distances is by the walking gait of a horse, and the traveler is told, when he inquires the distance to a given village or city, that it is so many caravan *days* or *hours*, which of course is not uniformly the same. This to a stranger is a great annoyance."

## Science Familiarly Illustrated.

### HEAT AND COLD.

BY JOHN TYNDALL, ESQ., LL. D., F.R.S.

### Lecture IV.

In our last lecture I intended, if time permitted, to explain the action of the geyser of Iceland, but at the end of the lecture I found that the time was insufficient for the purpose; and I promised then to explain this wonderful spring in the lecture of to-day; but when I came to look at the other matter before me, I found that it was so abundant that I really could not get the subject of the geyser into it.

"The surface of Iceland slopes gradually from the coast toward the center, where the general level is about 2,000 feet above the surface of the sea. On this, as a pedestal, are planted the Jökull, or icy mountains of the region, which extend both ways in a northeasterly direction. Along this chain the active volcanoes of the island are encountered, and in the same general direction the thermal springs occur, thus suggesting a common origin for them and the volcanoes. From the ridges and chasms which diverge from the mountains, mighty masses of steam are observed to issue at intervals, and where the escape takes place at the mouth of a cavern, and the resonance of the cave lends its aid, the sound of the steam is like that of thunder. Lower down in the more porous strata, we have smoking mud pools, where a repulsive, blue-black, aluminous paste is boiled, rising at times into huge bladders, which on bursting scatter their slimy spray to a hight of fifteen or twenty feet. From the base of the hills upward extend the glaciers, and on their shoulders are placed the immense snow fields which crown the summits. From the arches and fissures of the glaciers, vast masses of water issue, falling at times in cascades over walls of ice, and spreading for miles and miles over the country before they find definite outlet. Extensive morasses are thus formed, which add to the monotony of the dismal landscape. Intercepted by the cracks and fissures of the land, a portion of these waters is conducted to the hot rocks underneath; here meeting with the volcanic gases which traverse these underground regions, both travel together, to issue at the first convenient opportunity, either as an eruption of steam or as a boiling spring.

"In the Great Geyser, we have a tube ten feet wide and seventy feet deep; it expands at its summit into a basin, which from north to south measures fifty-two feet across, and in the perpendicular direction sixty feet. The interior of the tube and basin is coated with a beautiful smooth plaster, so hard as to resist the blows of a hammer. The first question that presents itself is, how was this wonderful tube constructed? How was this perfect plaster laid on? A glance at the constitution of the Geyser water will, perhaps, furnish the first surmise. In 1,000 parts of the water the following constituents are found:

| | |
|---|---|
| Silica | 0·5097 |
| Carbonate of Soda | 0·1939 |
| Carbonate of Ammonia | 0·0083 |
| Sulphate of Soda | 0·1070 |
| Sulphate of Potash | 0·0475 |
| Sulphate of Magnesia | 0·0042 |
| Chloride of Sodium | 0·2521 |
| Sulphide of Sodium | 0·0088 |
| Carbonic Acid | 0·0557 |

"The lining of the tube is silica, evidently derived from the water; and hence the conjecture may arise that the water deposited the substance against the sides of the tube and basin. But the water deposits no sediment, even when cooled down to the freezing point. It may be bottled up and kept for years as clear as crystal, and without the slightest precipitate. A specimen brought from Iceland and analyzed in this institution, was found perfectly free from sediment. Further, an attempt to answer the question in this way would imply that we took it for granted that the shaft was made by some foreign agency, and that the spring merely lined it. A painting of the Geyser, the property of Sir Henry Holland, himself an eye witness of these wonderful phenomena, was exhibited. The painting, from a sketch taken on the spot, might be relied on. We find here that the basin rests upon the summit of a mound; this mound is about forty feet in hight, and a glance at it is sufficient to show that it has been deposited by the Geyser. But in building the mound, *the spring must also have formed the tube which perforates the mound;* and thus we learn that the Geyser is the architect of its own tube. If we place a quantity of the Geyser water in an evaporating basin, the following takes place: in the center the fluid deposits nothing, but at the edges where it is drawn up the sides of the basin by capillary attraction, and thus subjected to a quick evaporation, we find silica deposited; round the edge we find a ring of silica thus laid on, and not until the evaporation has continued for a considerable time, do we find the slightest turpidity in the central portions of the water. This experiment is the microscopic representant, if the term be permitted, of nature's operations in Iceland. Imagine the case of a simple thermal spring, whose waters trickle over its side down a gentle incline; the water thus exposed evaporates speedily, and silica is deposited. This deposit gradually elevates the side over which the water passes, until finally the stream has to choose another course; here the ground becomes elevated by the deposit, as before, and the stream has to move forward; thus it is compelled to move round and round, discharging its silica and deepening the shaft in which it dwells, until finally, in the course of centuries, the simple spring has produced that wonderful apparatus which has so long puzzled and astonished both the traveler and philosopher.

"Before an eruption, the water fills both the tube and basin, detonations are heard at intervals, and after the detonation a violent ebullition in the basin is observed; the column of water in the pipe appears to be lifted up, thus forming an eminence in the center of the basin, causing the water to flow over its rim. The detonations are evidently due to the production of steam in the subterranean depth, which, rising into the cooler water of the tube, becomes suddenly condensed and produces explosions. Between the interval of two eruptions, the temperature of the water in the tube gradually increases, but even immediately before an eruption, at no part of the tube is the water at its boiling temperature. How then is an eruption possible? Bunsen succeeded in determining the temperature of the water a few minutes before a great eruption, and his observations furnish the key of the entire enigma. A little below the center he found the water within two degrees of its boiling point, that is, within two degrees of the point at which water boils under the pressure of the atmosphere, *plus the pressure of the superincumbent column of water.* The actual temperature at thirty feet above the bottom of the Geyser, was 122° Centigrade, its boiling point 124°. We have just alluded to the detonations and the lifting of the Geyser column by the entrance of steam from beneath. These detonations and the accompanying elevation of the column are, as before stated, heard and observed at various intervals before an eruption. Imagine, then, the section of water at thirty feet above the bottom to be raised six feet by the entrance of a mass of vapor below. The liquid spreads out in the basin, overflows its rim, and thus the elevated section has six feet less of water pressure upon it; its boiling point under this diminished pressure is 121°; hence, in its new position, its actual temperature (122°) is a degree above the boiling point. This excess is at once applied to the generation of steam; the column is lifted higher, and its pressure further lessened; more steam is developed underneath; and thus, after a few convulsive efforts, the upper part of the column of water, through the sudden boiling up from the middle downward, is ejected with immense velocity, and we have the Geyser eruption in all its grandeur. By its contact with the atmosphere the water is cooled, falls back into the basin, sinks into the tube through which it gradually rises again, and finally fills the basin. The detonations are heard at intervals, and ebullitions observed; but not until the temperature of the water in the tube has once more *nearly* attained its boiling point is the lifting of the column able to produce an eruption.

"In the regularly formed tube the water no where quite attains the boiling point. In the canals which feed the tube, the steam which causes the detonation and lifting of the column must therefore be formed. These canals are in fact nothing more than the irregular continuation of the tube itself. The tube is therefore the sole and sufficient cause of the eruptions. Its sufficiency was experimentally shown during the lecture. A tube of galvanized iron six feet long was surrounded by a basin; a fire was placed underneath and one near its center to imitate the lateral heating of the Geyser tube. At intervals of five or six minutes throughout the lecture eruptions took place; the water was discharged into the atmosphere, fell back into the basin, filled the tube, became heated again, and was discharged as before.

"Sir George Mackenzie, it is well know, was the first to introduce the idea of a subterranean cavern to account for the phenomena of the Geyser. His hypothesis met with general acceptance, and was even adopted undoubtingly by some of those who accompanied Bunsen to Iceland. It is unnecessary to introduce the solid objections which might be urged against this hypothesis, for the tube being proved sufficient, the hypothetical cavern disappears with the necessity which gave it birth.

"A moment's reflection will suggest to us that there must be a limit to the operations of the Geyser. When the tube has reached such an altitude that the water in the depths below, owing to the increased pressure, cannot attain its boiling point, the eruptions of necessity cease. The spring, however, continues to deposit its silica, and forms a *laug* or cistern. Some of these in Iceland are of a depth of thirty or forty feet. Their beauty is indescribable; over the surface a light vapor curls, in the depths the water is of the purest azure, and tints with its own hue the fantastic incrustations on the cistern walls; while at the bottom is observed the mouth of the once mighty Geyser. There are in Iceland traces of vast but now extinct Geyser operations. Mounds are observed whose shafts are filled with rubbish, the water having forced a way underneath and retired to other scenes of action. We have, in fact, the Geyser in its youth, manhood, and old age, and death, here presented to us: in its youth, as a simple thermal spring; in its manhood, as the eruptive spring; in its old age, as the tranquil *laug;* while its death is recorded by the ruined shaft and mound, which testify the fact of its once active existence.

"Next to the Great Geyser, the Strokkur is the most famous eruptive spring of Iceland. The depth of its tube is forty-four feet. It is not, however, cylindrical, like that of the Geyser, but funnel-shaped. At the mouth it is eight feet in diameter, but it diminishes gradually, until near the center the diameter is only ten inches. By casting stones and peat into the tube, and thus stopping it, eruptions can be forced, which in point of hight often exceed those of the Great Geyser. Its action was illustrated experimentally in the lecture, by stopping the galvanized iron tube before alluded to loosely with a cork. After some time the cork was forced up, and the pent-up heat converting itself suddenly into steam, the water was ejected to a considerable hight; thus demonstrating that in this case the tube alone is the sufficient cause of the phenomenon."

Thoughout the lectures that have been hitherto given I have had occasion to admire the attention and patience of my younger hearers. My hearers are of different ages, but al-

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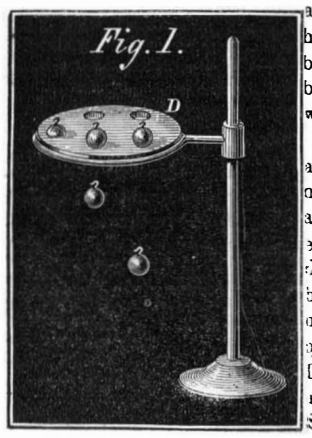
though I have been obliged to mention certain things that could not possibly be understood by the very young boys, and to mention some elementary facts which were, perhaps, very well understood by the older boys yet the young boys have been patient when I spoke to the elder ones, and the elder ones have been patient when I spoke to the younger boys; and for this I feel very thankful. With reference to the present lecture I have to address all the boys, especially the elder ones, for I have to explain a term or two very much used at the present time in connection with the subject of heat.

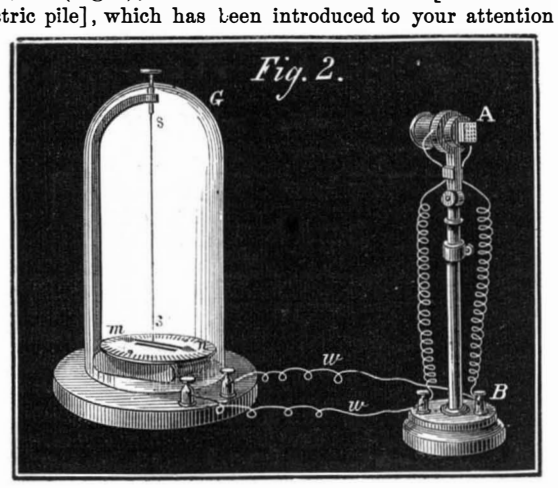
If you carry a pound of any substance whatever to a hight of 772 feet above the earth's surface, and allow it to drop down upon the earth from that hight, you always get the same amount of heat generated, and that amount of heat would be just sufficient—I mean neither more nor less than sufficient—to raise the temperature of one pound of water one degree Fahrenheit. Thus, if you conceive a pound weight falling from this great hight, 772 feet, and conceive all the heat generated by its collision with the earth collected together and put into a pound of water, that pound of water would have its temperature elevated one degree. Now, by proper means we can reverse this process, and by means of heat we can lift the pound weight. If we lift the pound weight to a hight of 772 feet, of course we should then be pulling it, as it were, away from the earth which attracts it; and in order to lift this pound weight to that hight we should consume—in fact, annihilate, destroy—an amount of heat equal to that which would raise a pound of water one degree in temperature; so that the amount of heat consumed in lifting the weight 772 feet is exactly equal to what is generated when the weight falls from a hight of 772 feet. Now, if we lift one pound of matter one foot from the ground, a certain term is employed. It is called "*the foot-pound*;" and if you lift a pound weight to 772 feet it is 772 foot-pounds; or if you lift 772 pounds to the hight of a foot you have 772 foot-pounds. Now, this quantity of 772 foot-pounds, which would raise the temperature of a pound of water one degree, is termed "*the mechanical equivalent of heat.*"

In lifting a weight from the earth we are overcoming attraction of the earth, and in doing this we consume heat, if heat be the agent which lifts the weight. Now, I have asked you over and over again to figure the atoms of solid bodies such as this I hold in my hand. As a general rule, when heat is communicated to a body the atoms are forced asunder. You know the enormous power and force with which these atoms may attract each other, for I showed you that when an iron bar was cooled the contractible force pulling together its atoms—the mutual attraction of its atoms on cooling—was sufficient to smash the steel bar which you saw broken in front of the table. Now, we have among the atoms of bodies pulling each other together an action substantially the same as that which occurs when we separate the weight from the earth. To this action we may give a name. Let us call this work which occurs in a body "atomic work" if you like—work done on the atoms. This work necessitates a consumption of heat. Heat is consumed in this way; and what I want you now to bear in mind is that the amount of heat consumed is very different indeed in different bodies; and consequently some bodies, in order to raise them one degree in temperature, require more heat than others. In order to raise one pound of the liquid metal mercury one degree in temperature a certain amount of heat must be imparted to it. It would require *thirty times* that amount of heat to raise a pound of water one degree in temperature. Water requires thirty times the quantity of heat required by mercury, simply because the work to be done is a great deal more than that necessitated in the case of mercury. Now, I want to show you what follows from this action. It would appear, in consequence of this atomic work which I have been speaking of, as if the water had a power of storing up heat thirty times greater than the power possessed by mercury; and, indeed, formally people thought that heat *was* something stored up, and they called the amount of heat which it was needful to impart as a body to raise its temperature one degree its "capacity for heat." They looked at a body as a kind of vessel for heat, and hence they used this term "capacity for heat." It was found by experiment that the capacity for heat (as the term went) was very different in different bodies; and the amount of heat which a body had stored up was determined by what the body could do—by the amount of ice or wax which it could melt.

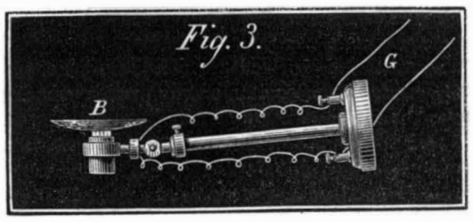



I have here a vessel of hot oil, and in it I have spheres of metal of different kinds. They are all equally hot at thep resent time; but you will find that these spheres of metal have very different powers in melting bodies. They will be placed on a flat piece of wax, D (Fig. 1), and their heat will act upon that piece of wax. Some will force their way through, and others will not. This ball of copper will go through the wax first. The tin will go partly through. The bismuth certainly will not go through, although it is just as hot as the copper. Here, too, we have a ball of lead which is not competent to melt its way through the wax. The ball of iron will go through. Here is a ball of zinc; I think that will go through; but I am sure that the lead and tin and bismuth will not do so. [The balls of copper, iron, and zinc melted their passage through the slab of wax, and fell to the ground one after the other. The three other balls did not perforate the wax.] This illustrates the different amounts of heat possessed by these bodies, although they are all at the same temperature.

We must now go on considering the heat consumed; and I must rapidly make a few experiments illustrative of the consumption of heat in this work of forcing the particles of bodies asunder or changing their position. One of the most remarkable cases of the consumption of heat occurs when a body is caused to pass from the solid state to the liquid. Here, A B (Fig. 2), I have a beautiful instrument [the thermo-electric pile], which has been introduced to your attention



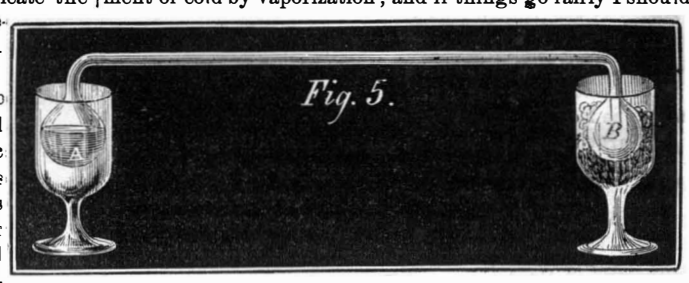

before. It is a kind of thermometer, and I want to show you how we can make use of this instrument for the purpose of ascertaining whether we have cold or heat. I cannot go into the full explanation of the thing; but if you observe the needle, *m n*, of the galvano-meter, G, to which it is connected by the wires, *w w*, you will see how wonderfully delicate the instrument is. It is more delicate than any thermometer whatever. I will turn the face of that instrument towards me, or I will breathe against it, or I might allow any young philosopher present to breathe against it. The warmth of his breath would at once make itself evident by causing that magnetic needle to move. Now, as I breathe against this pile, you observe that the red end of the needle comes towards me. When the needle returns to its former position and comes to rest, I will try the effect of cold upon the instrument, which, you will remember, is called a thermo-electric pile. (You see I can stop the needle by this other one.) I will now put a piece of this ice in a spoon, and on the cold spoon coming in contact with the face of the pile you will see that the red end of the needle will move towards you, and away from me. Thus, in this instrument we have the means of telling whether heat or cold has been imparted. We now again bring the needle to rest. And now we have made the acquaintance of this beautiful instrument, I will proceed to experiment with it. Here is a




little flat basin, B, which I place upon the face of the pile, thus; and you observe that although that dish has been up to the present time resting upon the table it has become a little warm, and causes the red end of the needle to move towards me. But when I pour a little cold water into this dish you see the suddenness of the movement of the red end of the needle towards you. I will now warm this water by dipping my finger into it, and after a time you will see that the needle will come down in consequence of the warmth imparted to it by my hand, and come back on the other side of the middle line. [After a pause.] You see that the needle now comes to my side, showing that the water is warmed by my finger. And now I might take sugar, or salt, or saltpeter, which would be still better, and put a little of the powder of that saltpeter into the water. That powder would become liquefied; and on its melting the warmth of the water is consumed—is used up, and the water is thereby chilled. Now, in making this experiment I will confine myself to a particular substance called sulphate of soda. You see that there is now a very great deal of heat imparted to the water by my finger and that the needle comes very much on my side of the middle line. I will now pour into the water some powdered sulphate of soda, and you find that the water immediately becomes chilled by melting that sulphate of soda. This, then, is a consumption of heat by the act of liquefying or melting the sulphate of soda. I want now to make another experiment. It is a very instructive one. I want to show you the reverse of the last experiment. When dissolved sulphate of soda is permitted to solidify—become solid—you get out of it the heat that was expended in rendering it liquid. I have in this flask, B Fig. 4, some dissolved sulphate of soda. It was carefully melted last night, and has been carefully kept apart from any thing which could disturb it. We will allow the

face of the pile to rest against the bottle; and now I want to cause that body to solidify before your eyes. I can cause it to become crystallized sulphate of soda, like that which was dissolved in that dish a moment ago. You will see the liquid in the flask become more and more opaque, and when it begins to solidify opposite the face of the pile it will give out heat—the heat that was expended in melting it, and you will then see the red end of the needle come towards me. I will now open the neck of the flask, and throw a crystal of sulphate of soda into the solution. [This was done, and the contents of the flask began to solidify from the top downwards.] You now see the compound crystallizing; and the moment that portion opposite the face of the pile becomes solid, heat will be communicated to the face of the pile, and we shall get a deflection (as it is called) of the red end of the needle in the direction in which I stand. [After a pause]—What I predicted was quite right. There we get out of the sulphate of soda the heat that was expended in melting it. There is the movement of the needle caused by the heat.

I might go on in this way, and show you that when a body is evaporated you also get a very large amount of heat consumed—used up—in order to evaporate it. In order to convert a pound of water at 212° Fahrenheit into steam at 212° Fahrenheit, an enormous amount of heat is required. It requires as much heat as would raise 967 pounds of water 1° Fahrenheit; and this heat is insensible to the thermometer, although it is so great. The reason that I employed a mixture of ice and salt as a freezing mixture in a former experiment, was that the action of the salt produces a liquefaction of the ice, and on that liquefaction taking place a large quantity of heat is consumed—so much that the temperature of the liquid is reduced far below the temperature of the ice itself. I am going to illustrate this point by the development of cold by vaporization; and if things go fairly I should




not wonder if I could freeze water before your eyes by means of its own evaporation. An experiment has been arranged there for the purpose. Here are two bulbs, A and B, in this apparatus (Fig. 5), and the water which was in one of them has been frozen in this room since the lecture began. One end of this has been placed in a freezing mixture far away from the bulb where the water is frozen. This instrument is called a "cryophorus," or ice carrier. Water was placed in one bulb, and the air was taken from the interior of the instrument. The other bulb was placed in a freezing mixture, and as the vapor came over from the water it was condensed by the freezing mixture, and the vaporization which took place has been sufficient to freeze the water.

So much, then, for the heat consumed in causing a body to pass from the liquid state to the state of vapor. I have on the table various substances which would enable me to illustrate this in a very satisfactory manner. For instance I will take a little alcohol, and warm it by placing my finger in it, thus. I see there is a great amount of heat in the face of the pile. I have no doubt that the evaporization will very soon cause the end of the needle to come down; or if I take a substance that can vaporize more rapidly than alcohol—this substance, ether—it would not take an instant in order to overcome the heat which is the cause of that deflection. I will cause evaporation to go on a little more quickly, and if the needle be not held fast by some accident we shall soon find the heat which causes the present large amount of deflection entirely abolished, and the needle will move down, now you see the needle comes back. We get an enormous amount of cold by the evaporation of ether, so much that we can easily freeze water by it.

### Improved Electrical Process of Generating Gases.

John T. Rich, of Philadelphia, Pa., has lately patented the following:—

A gas retort heated by a furnace is employed. This retort is intended to be filled with fluid hydrocarbon. The fluids are caused to flow toward the center of the retort through the spaces formed by a volute partition, and being thus exposed to the action of the heat, they are evaporated. The vapor rises through a pipe, which terminates in a cone. A steampipe terminates in said cone, as does also an atmospheric air pipe.

The operation of the apparatus is as follows: By the action of particles of steam mingled with globules of water, commonly called wet steam, upon the sides of the cone, electricity is generated, the amount of which may be increased, according to well known principles, by making the cone of hard wood, and also by causing the jet of steam to impinge upon a brush of points or by using a cone of ground glass. This jet of steam, passing through the apex of the cone, carries with it the gas or vapors from the retort, and the electricity generated by the jet of steam acts upon the atmospheric air admitted through the pipe, setting free a portion of the oxygen, the nitrogen, uniting with part of the oxygen, forming nitric acid. After the gases or vapors passing from the retort are thus mingled with the oxygen, they are carried through water, which takes up the steam which has not been decomposed, and the nitric acid, thus forming a permanent gas not subject to condensation.

The use of a retort may be dispensed with, and oxygen

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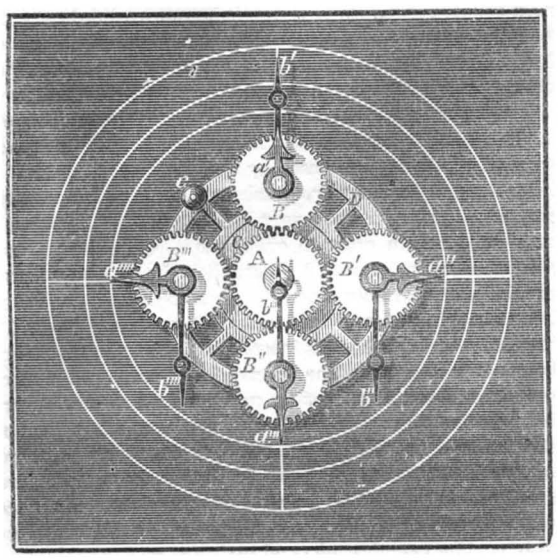
gas be generated alone, which may be employed for chemical distillation, for the desulphurization of ores, and other suitable purposes.

## THE WHEEL QUESTION.

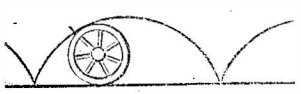
W. E. H was one of the earliest to send us a model illustrative of the views of the two revolution philosophers; but when the engraving of the model was ready we found that we had mislaid his letter. We have therefore been obliged to delay the publication of the engraving until we could communicate with him.



Above is the view of his model. A is the fixed wheel, set on a fixed disk, C; B the movable wheel, carried on a movable disk, D, which is turned by button, *c*. A long pointer, *b'* is attached to the center of the movable wheel, B. The axial line of the movable wheel we have for the convenience of the eye, enlarged into the form of the short pointer, *a'*: instead of a pointer, a dot or other figure might be used. This short pointer our correspondent wishes us to say, is not on the model. B' B" B"' are the several positions of the movable wheel in passing around the fixed wheel. The following is the letter of W. E. H:

MESSRS. EDITORS:—A wheel may properly be said to revolve on its axis, when each point in the circumference of the wheel is successively in every direction from that axis; *i.e.*, if the wheel is vertical each point of the circumference in succession is above, on one side, below the axis, on the other side, and again above: if the wheel is horizontal each point is successively east, south, west, north of the axis or in reverse order. In the case before us, the spokes of the wheel or an index placed upon it would point in order to all the figures on a large clock dial surrounding it. That this is the true and only idea of a revolution, seems to me evident from a simple illustration.

A wagon wheel is said by every one to revolve on its axis (or axle if you choose) when the wagon is drawn forward. This was your illustration on page 67 of the last volume. Why "revolve?" Because each point of the tire in succession is above the axis on one side of it, below it, etc. The actual path described by such point is a cycloid never returning into itself. I give a diagram which will make this clear to unscientific readers.



I refer, also, to Watt's sun-and-planet wheels, designed by him to take the place of a crank and in the use of which he mentions as an advantage, the fact "that one stroke of the engine produces two strokes of the wheel, while with a crank, one stroke of the engine gives but one revolution to the wheel." I regard this device of Watt's as the converse, so to speak, of the question under consideration.

Referring to the engraving I take this ground: 1st. That the long index shows clearly that the movable wheel makes two revolutions while rolling round the fixed wheel. 2d. That the short index, if it shows anything, shows that the bearing (not axis) of the movable wheel makes one revolution 3d. That the two revolutions of the movable wheel are made on the bearing, the central line of which is the axis. I add also the suggestion prompted by the addition of the second index that the question is not how many more revolutions the wheel makes than its axis, but how many it makes on the axis.

W. E. H.

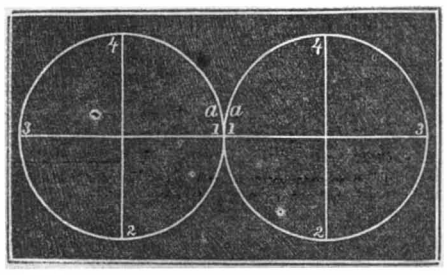
We have understood W. E. H. to be among those who maintain that a movable wheel makes two revolutions on its own axis in rolling once around a fixed wheel of the same diameter. But he does not positively state so in the above explanation. He says, 1st. that the movable wheel makes two revolutions. Does he mean on its own axis, or around the axis of the fixed wheel, or what? 2d. He says that the *bearing* (not axis) of the movable wheel makes one revolution. 3d. He says that two revolutions of the movable wheel are made on the *bearing*, (not axis.) Our correspondent has not clearly answered the question which he correctly propounds in the concluding sentence of his letter.

Whether the axis of B rotates or not, its position is changed by the passage of B around A. One position of the axis is indicated at *a'*, another at *a"*, another at *a"'*, and another at *a""*. By observing these positions, and the movement of the wheel, B, in respect to them, as indicated by the long pointer, it will be seen that the wheel, B in passing once around A, makes one revolution on its own axis. The other movements made by B—*i. e.*, those not made on its own axis—need not be here noticed.

MESSRS. EDITORS:—I submit another style of proof from any yet advanced in support of the "dual theory." It has been effective among the "*one*ists" of my acquaintance, and I hope it will answer as well with you.

A wheel, say three feet in circumference, rolled three feet on a plain surface, will make exactly one revolution; but if (as in the problem) it is ALSO required *to make the circuit of another wheel*, it must necessarily make another revolution to do it, otherwise there is no difference between a plane and a circle.

Again, I have two movable wheels of the same size hung side by side, thus—



I find, in turning them toward each other at equal speed, that it takes just *one* revolution of *each wheel* to bring the points, 1, 1, again together; *consequently* if one was stationary, it would take just *two* revolutions of the other around it to bring about the same result. Be kind enough to show the fallacy of these two propositions, or surrender at once to the victorious "dualists."

F. L. B.

Boston, Mass.

We think there may be a difference between a plane and a curve, whether the wheel makes a second revolution or not. Because two wheels of the same size each revolve once in returning to a given point, it does not consequently follow that if one wheel were fixed, the other wheel would have to revolve twice around the fixed wheel in order to reach the starting point.

We have received a model which shows two revolutions of a shaft produced by one revolution of the movable wheel. Also a model which shows one revolution of a shaft by one revolution of the movable wheel. Also a model which the senders think shows two revolutions of the movable wheel when a rod is set in a particular way, and one revolution when set in another way. We have also received a variety of novel diagrams upon the subject, one of which shows how four revolutions of a shaft attached to the axis of a movable wheel may be produced by one revolution of the wheel upon its axis. We shall shortly present diagrams of some of these devices.

### Compostion Fuel.

The mixture of tar, coal dust, sawdust, tan bark, peat, and other inflammable refuse stuff, and the pressing of the same into blocks, for the purposes of fuel, is very common, and several patents have been issued for variations of such mixtures. Washington Stickney, and Nathan B. Chase, of Lockport, N. Y, have lately obtained one of these patents, and they say:

"The coal consists of screenings and other fine portions, which accumulate in great abundance in coal yards, and hitherto have been considered comparatively valueless. The tan bark used (commonly called spent tan bark) is also comparatively useless and very abundant. These, with other ingredients, hitherto considered of little or no value, are so combined as to form a cheap and convenient fuel, and may be compressed, by mechanical power into blocks convenient for use. The coal tar cements the whole, making a solid mass, which may be readily ignited, and is well adapted for common fuel, especially for summer use.

"The above ingredients are combined in the following proportions, to wit: Coal, 3 parts; tan bark, 2 parts; sawdust, 2 parts; peat, or other fine woody or vegetable matter, 1 part, coal tar or pitch, 1 part, or sufficient to cement the whole; or they may be combined in a greater or less proportion of either, securing substantially the same result. The whole mass may be easily ignited with shavings or paper, or more readily by the application of a small quantity of benzine and a match."

### Richardson's Process for Making Steel.

Many of the puddling furnaces of Great Britain have lately been improved by the addition of an apparatus for blowing air into them, resembling that used by Bessemer in making steel directly from the ore. The application of the improvement requires no alteration in the form of the common puddling furnace, for it does not essentially change the old method of puddling; but by introducing air through the iron rake or rabble used to stir the metal it reduces in quality or duration one particular stage of the process. Instead of numerous small holes in the blast pipe or tubular rabble, to subdivide the current of air, there is one broad slit or rectangular opening about half an inch wide, and three or four inches long, which is more easily kept free from slag. Two or three tubular rabbles are fitted to each furnace, to be used alternately, in order to prevent over-heating. Each one is connected to the air receiver by long flexible tubes of india-rubber. The air is turned on before the rabble is introduced, and remains on until it is withdrawn, in order to prevent the narrow aperture from being choked by cinders. By means of the blast rabble the time occupied in bringing the molten iron to a "boil" has been reduced from 30 or 40 minutes to 10. At the beginning of the operation the sparks thrown off indicate that silica is being separated from the mass, and as soon as the flame is clear the tubular rabble is withdrawn and the common rabble is substituted. A number of experiments have demonstrated that the whole process from the time an ordinary furnace is first charged until the mass is finished does not consume more than one hour and a quarter. The quality of the material produced is said to be superior, and in no case thus far has there been any failure to produce the desired results.

## MANUFACTURING, MINING, AND RAILROAD ITEMS.

From a recent report of the Commissioner of the General Land Office, it appears that the construction of railroads in this country, since their first introduction, has been at the rate of a thousand miles a year; that there are now completed no less than 37,000 miles, and in course of construction 17,860 miles additional, or more than one third the length of all the railroads in the world. To assist this wonderful development, Government has contributed over $184,000,000, and 869,000 acres of land.

South Pass City, the headquarters of the last mining sensation, the Sweetwater gold field, was first laid out in October, 1867. It has now eighty houses and eight places of business. Its population at present is but 700, but it is confidently expected that next summer will witness the advent of from twenty to thirty thousand eager searchers for wealth, and that South Pass City will experience a much more rapid and substantial growth than even Cheyenne City.

There is now in course of manufacture at a leather belting factory in this city, what is said to be the largest leather belt ever made. The width is 47 inches; length, 100 feet; weight, 18,000 pounds; and cost, $2,000. It is composed of triplicate layers of leather, making a thickness of three quarters of an inch, and cemented and pressed so firmly together that it has the appearance of one solid piece.

A bed of hematite iron ore has been discovered at Sinking Spring, some four miles from Reading, Pa. Parties have already sunk a shaft which passes through a solid bed of ore twenty-six feet in diameter.

From this city, via Philadelphia and Pittsburg, to Cheyenne City, at the base of the Rocky Mountains, a distance of 1,917 miles, but three changes of cars are made, and five companies control the whole distance. Between New York and New Orleans, 1,500 miles, there are ten different roads, while between New York and Charleston, only 788 miles, there are also ten.

A railroad project to unite the capital of Mexico with the United States, by a line along the Gulf coast, has been referred to a committee of the Mexican Congress.

About four miles from the newly opened Japanese port of Hiogo, is quite an extensive deposit of coal. The methods of working the mines are of the most primitive description. Wherever the coal or shale has been seen cropping out from the hillside, a horizontal passage, never more than twenty-five feet long, has been run in. The miners, crouched to the ground in these burrows, with pointed hammers pick away at the sides, and very carefully assort with their hands each little piece of coal obtained, according to its quality. The Japanese Government is not insensible to the advantages of an improved mode of working the coal of Hiogo, and it is not impossible that before long some more systematic plan will be introduced.

Scarcely inferior in interest to Krupp's mammoth establishment, are the great iron and steel works of Hoerde, employing 4,500 people. Here the iron is produced from the ore, and converted into castings of various kinds, into iron and steel rails, and into puddled steel sheets suited for a variety of purposes, ship-building among others. Most of the vessels built by one of the largest firms in Liverpool are constructed entirely from steel plates made at Horde.

The *Memphis Bulletin* says that the gold discoveries in the counties of Polk and Sevier, Arkansas, are still proceeding, while the indications have proved so encouraging, and so exciting has been the degree of success already achieved, that the winter's snow and cold has not been able to suspend operations now in progress.

There are now about 12,000 miles of railway open to travel in France. Every line is remunerative, some paying original stockholders from 20 to 25 per cent, and it is claimed that passengers are conveyed by them with more regularity, safety, and comfort than elsewhere in Europe. Within eighty years, at the farthest, all these lines will have reverted to the Government and become practically public property.

M. Goudin, some years ago, made exceedingly hard iron by combining it with a small quantity of boron. It is now said that he has produced an equally hard material by combining fused cast iron with phosphate of iron and peroxyde of manganese. The mixture cannot be forged, but is easily cast.

The Boston and Providence railroad are constructing a bridge from India Point, over the Seekonk river, on a plan which embraces some new features. The whole length of the bridge is 876 feet, and the supports in the river are iron cylinders filled with wooden piles and concrete. Six of these cylinders are six feet in diameter, and contain twelve piles, which were driven into the mud forty feet, the cylinders being sunk ten feet. Iron cylinders filled with concrete have been used before, but driving piles within them, and the combining of wood and concrete is a new experiment.

## Recent American and Foreign Patents.

*Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.*

COTTON AND HAY PRESS.—William Russell, Atlanta, Ga.—This invention relates to that class of presses in which the power is applied to the follow block by revolving the press box. The improvement consists in working the follow block upon two screw rods, in a device for causing the follow block to adjust itself, and in a device which enables the apparatus to be used as a stationary or portable press, and to be worked either by rotating the press box, upon a fixed wheel, or rotating the wheel while the box is stationary.

EXTENSION COAL SHUTE.—Jacob Heatherington, Bellaire, Ohio.—This invention relates to coal shutes which are used on the banks of rivers and at wharves, for discharging coal from cars into steamboats and other vessels, and consists in making them extensible in order that they may be adjusted to vessels in different positions, and at different distances from the shore.

COMBINED STEAM ENGINE AND CANE MILL.—John Moore, Madison, Ind.—This invention relates to a cane mill, the frame of which is so constructed as to be susceptible of receiving such parts of a steam engine, as would be necessary to drive the rollers of the mill; and also in so constructing the said frame that the rollers of the mill can be readily removed therefrom, and placed therein, to enable the steam engine, which is arranged in connection with such cane mill, to be used for threshing wheat, driving a circular or a drag saw, a shingle or a lath machine, a straw or hay cutter, a grinding-mill for corn, and for many other purposes.

COMBINED SCREW WRENCH AND CLAW HAMMER.—Ellis R. Meeker, Elizabeth, N. J.—This invention consists in combining a screw wrench with a claw hammer in such a manner that the device may be used either in the capacity of a claw hammer or a wrench with as great facility as if it were made for either purpose alone.

BEEHIVE.—W. Y. Singleton, Springfield, Ill.—This invention relates to an improvement in the construction of beehives, and has for its object the wintering of the bees in a perfect manner, keeping them warm and dry, to which end a thorough ventilation of the hive is obtained, and due provision made for the absorption of all moisture.

PUMP.—Jas. Vaughn, and John Magee, Galena, Ill.—This invention consists in a novel construction and arrangement of the various parts composing the pump, whereby great effectiveness and many advantages are secured.

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ATTACHING HUBS TO AXLES.—Levi Adams, Amherst, Mass.—This invention relates to the manner of attaching hubs to axles. The object of this invention is to obtain a good bearing for the hub on the arm, effectually prevent the escape of lubricating material from the arm, prevent the advent of dust between the box and arm, and admit of the wheel being readily attached to and detached from its axle.

COMBINED STAMP AND CANCELING DEVICE.—Joseph H. Berret, New York city.—This invention relates to a device by which revenue stamps may be marked or printed, and canceled at the same time. The invention consists in applying a cutting device to the ordinary hand stamp, in such a manner that, when the face of the stamp is forced down upon the revenue stamp, and the latter printed with the name of the party or firm canceling the stamp, the cutters applied to the hand stamp will perforate the revenue stamp, and effectually cancel the same.

LATHE REST.—H. K. Smith, Norwich, Conn.—This invention consists in so constructing the nut (through which the screw shaft works), for carrying the frame on which the block holding the lathe cutting is arranged, as to move the tool toward or away from the article on which it is to act, and that such nut, should the screw work loose, or play from side to side, can be tightened up therein. Also, in so hanging the block, holding the cutting or lathe tool, to a frame—arranged to be moved forward to or backward from the work on which the tool is to operate—that such block can be inclined either more or less in a direction toward the work, as may be desired.

LOADING FIRE-ARMS, AND CARTRIDGES FOR THE SAME.—S. S. Rembert, Memphis, Tenn.—This invention relates to double-barrelled breech-loading fire-arms, more particularly, and to cartridges for the same. It consists in a projection at the breech end of the barrels, between the two, of such a shape in combination with a correspondingly shaped recess or notch in the upper portion of the stock or butt, that when such projection fits in the said recess, the barrels will be held securely in position while being discharged. Also, in a novel connection between the trigger and guard, and the barrels, in combination with hinging the barrels to the butt or frame, whereby, by properly swinging such trigger guard, the barrels can be thrown up and out of place for removing or inserting a cartridge, and brought back into position, as may be desired. Also, in a cartridge case, provided with a nipple in a novel and peculiar manner, and a novel constructed nipple for the cartridge case. Also, in a simple attachment to the gun barrels for extracting the cartridge cases therefrom.

ANIMAL TETHER.—Martin Leonard and Stephen C. Leonard, Oberlin, Ohio.—This invention relates to a method of constructing tethers, whereby the same are rendered more durable and horses more effectually prevented from jumping or breaking down fences.

INNER SOLE.—R. A. Webster, Sandisfield, Mass.—This invention relates to a method of constructing inner soles for boots or shoes, whereby the same are more cheaply made and more durable, and are rendered impervious to water. It consists of one or more pieces of wood or veneers, a thin piece of wood, and a piece of felting or cloth, between which is a thin layer of gutta percha or rubber, by the warming of which all the several layers are firmly cemented together.

STEAM GENERATOR.—W. H. Thomas, Sacramento, Cal.—This invention relates to an apparatus for heating water and generating steam for various purposes.

APPARATUS FOR WORKING WINDLASSES.—Porter Evarts, Madison, Conn.—This invention has for its object to so improve the construction of the apparatus for working a ship's or other windlass, that the operator can instantaneously adjust it to obtain increased power or increased speed, as he may desire.

BURIAL CASE.—J. R. Hathaway, Westfield, N. Y.—This invention consists in forming the burial case of cast-iron plates, which are dovetailed and grooved together, the joints of which are secured and rendered air and water tight by melted lead or other equivalent metal.

FANNING MILL.—Stewart McMillan, Fletcher, Ohio.—This invention relates to an improvement in the construction and arrangement of fanning mills for cleaning small grain and seeds, and consists in building the main side frame of cross bars, making it very cheap, light, and strong, and in combining the rotary fan and the sieves in such a manner that they work with great facility by means of a crank movement connection.

PORTABLE CHAMBER CLOSET.—Wm. J. Lyman, East Hampton, Mass.—This invention relates to a new arrangement whereby most of the advantages of the real water closet are obtained, in the sick chamber as well as in chambers and dwellings generally.

CHURN.—Daniel H. Carpenter, Hector, N. Y., and Hiram L. Slaght, Lodi, N. Y.—This invention relates to the method of constructing and operating churns for dairy purposes, whereby the ordinary single or double dasher barrel churn is operated with much less labor or exertion of strength than in the ordinary manner.

FAN VENTILYTOR.—H. B. Worth, Chicago, Ill.—This invention has for its object to improve the construction of the ventilator known as Griffith's patent ventilator, so as to make it more effective and satisfactory in operation.

ANIMAL TRAP.—James A. Sinclair, Woodsfield, Ohio.—The object of this invention is to furnish an improved trap, so constructed and arranged that the rat, in seeking to reach the bait, shall cage himself, and in seeking to escape, will operate mechanism by the action of which he will be killed and thrown from the trap, leaving it set for the next rat.

MACHINE FOR MAKING PEARL BARLEY, ETC.—W. Rickard, Chicago, Ill.—This invention has for its object to furnish an improved machine for making pearl barley, pearl wheat, splitting peas, removing a part of the bran from wheat before making it into flour or farina, and other similar purposes, which will do its work quickly and well, and which will not be liable to get out of order.

SEPARATOR SIEVE.—Joseph Barker, Amboy, Ill.—This invention relates to a method of constructing the sieves of fanning mills, whereby one kind of seeds is more perfectly separated from another, and more easily free themselves from chaff and refuse. It consists of a frame covered with wire gauze on both sides, a portion of the wire gauze on one end of the frame being coarser; also, in the frame being inclined at the back end of the same, whereby the same cleans itself from chaff or refuse.

COTTON CULTIVATOR AND CHOPPER.—Zina Doolittle and A. M. Crowder, Houston Factory, Ga.—This invention relates to a device for cultivating cotton, scratching the earth from the hills of the plants, removing weeds, etc., thinning out the plants and throwing fresh earth up to the same, all being done simultaneously, or at one operation.

HARNESS.—John J. Smokey, Natchez, Miss.—This invention relates to the driving-reins of harnesses, and consists in so arranging the driving-rein as to give great leverage to the driver over the animal, and thus enable him to easily control it, without irritation, but leaving it free to use its utmost speed, and in fact to encourage it so to do, while at the same time the animal can be readily checked by the driver.

BEEHIVE.—Daniel S. Bear, Toledo, Iowa.—In this invention a beehive is constructed in two parts, and so that they may be readily separated whenever required, and the filled half of an occupied hive united to the empty half of an unoccupied hive, and colonies of bees multiplied without the natural process of swarming, and therefore without the trouble, risk, and annoyance of living.

GRAIN THRESHER.—A. S. Whittemore, Willimantic, Conn.—This invention relates to a method of constructing machines for the threshing of grain by hand or power, whereby the same is more effectually done without unbinding the bundles, and the straw left in better condition. It consists of a box frame through which are longitudinal parallel wires, on which the grain is placed to be threshed, and also of arms attached to an axle rotating in suitable bearings on said frame, between each pair of which are pivoted any convenient number of flails.

SILK CLEANER.—W. G. Watson, Paterson, N. J.—This invention relates to a device for cleaning silk while the same is being wound on bobbins, and consists in the use of horizontal instead of vertical guides, whereby the lateral motion of the thread as it is being wound spirally around the bobbin is accommodated.

SCROLL SAW.—B. J. Camp, Marion, Ohio.—This invention relates to a new manner of fastening, straining, and guiding reciprocating scroll saws, so that the same will work with great ease, and can be operated with the greatest speed without jarring or getting out of order.

STEAM VALVE.—Wm. Ord, Brooklyn, Ohio.—This invention relates to a method of constructing steam engine valves, whereby they operate without sticking from the unequal expansion of the parts, and are more easily adjusted, and the wear from friction more economically provided against. It consists of the combination of a valve stem with cylindrical segments, or valves, and two wedges with an intermediate key, so arranged in connection with a set screw that by forcing the key between the wedges, the segments or valves are drawn together, and the pressure against the valve casing relieved.

SHACKLE FOR THE PLATFORM SPRINGS OF WAGONS.—John Price, New York city.—This invention relates to a shackle or joint by which the ends of the several parts comprising what are generally termed platform springs are connected together. The parts of these springs are at present connected by shackles or joints which do not admit of any horizontal play of the latter and the springs are consequently subjected to considerable strain and injury, the leaves of each part being frequently disengaged from the nibs which keep them in place. This invention is designed to obviate this difficulty by constructing a more flexible joint than hitherto used.

DEVICE FOR CHANGING FEED.—R. L. Nelson, Mexico, N. Y.—This invention relates to a device for changing the feed of saw mills or other suitable machines and consists in the general combination of the devices by which the desired result is obtained, also in a new manner of arranging the gear wheels and in a new method of moving the shifting gear and of throwing in gear with the driving and driven gears.

CAR VENTILATOR.—M. T. Hitchcock, Springfield, Mass.—This invention relates to a car ventilator in which a sliding valve is employed which is moved by the wind to the rear end of its case or shell in whatever direction the car may advance.

HEAT DEFLECTOR.—Lewis Dowe and Aruna C. Colton, Sycamore, Ill.—This invention consists in arranging a series of adjustable slats within the drum or tube by which the current of heated air and gases from the fire or air chamber may be deflected and retarded in their course, and thereby compelled to part with their contained caloric.

PROTECTING HEELS OF BOOTS AND SHOES.—John Fearn, Tompkinsville, N. Y.—This invention relates to an improved mode of applying a screw to the heels of boots and shoes for the purpose of preventing them from wearing away unevenly, or more on one side than the other, and also to prevent slipping on ice where liable.

PUMP.—Taylor Chamberlin and T. Ellwood Garrett, Philadelphia, Pa.—This invention relates to a method of constructing pumps whereby they are greatly simplified in their parts and rendered more durable than those of ordinary construction, and the invention consists in a hollow shaft and piston, and in the manner in which the cylinder is constructed and the water discharged therefrom.

WELL-TUBING APPARATUS.—N. C. Clark, Low Moor, Iowa.—This invention has for its object to improve the construction of well tubing, and the manner in which it is inserted in the ground so as to make it more reliable and convenient in use.

CARRIAGE JACK.—Adam Myers, Van Wert, Ohio.—This invention has for its object to improve the construction of carriage jacks so as to make them more convenient and effective in operation.

CAR COUPLING.—John C. Heaton, Fitchburgh, Mich.—This invention has for its object to furnish a simple, strong, and reliable car coupling which shall be self-coupling, and shall have no springs to get out of order.

CORN PLANTER, SOWER, REVOLVING HARROW, AND CULTIVATOR.—W. P. Byler, Leavenworth, Kansas.—This invention has for its object to furnish an improved machine for planting and cultivating corn, harrowing ground, and sowing and putting in grain, which shall be simple in construction, effective in operation, and easily and quickly adjusted for one or the other of said uses.

SULKY PLOW.—Elias Levee.—This invention has for its object to furnish an improved sulky plow, so constructed and arranged that it may be easily raised from and lowered into the ground, which will not be raised out of the ground by the wheels passing over obstructions or rough places, and which shall be simple in construction and easily adjusted to run at any required depth.

## Answers to Correspondents.

*CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.*

*SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."*

☞ *All reference to back numbers should be by volume and page.*

C. W. Y., of N. Y.—See reply to "G. W. E.," in No. 8, current volume, SCIENTIFIC AMERICAN, as to the estimating of horse-power of engines.

J. W. B., of N. Y.—"What are the lightest liquids known and the process of manufacture? Can water be made lighter by chemical means, and if so by what process?" The light products of petroleum are the lightest liquids known. They are separated from the heavier portions by distillation. Water can be made lighter in the same way—that is by boiling. It then becomes steam which is the vapor of water, commonly called, but not properly, water. The addition of any chemicals could only increase its weight.

J. B. R., of N. Y.—"Will you, or some of your readers inform me the method of clearing cinder from the fire brick of a hard coal stove? How can I loosen the tops of lamps fastened with plaster of Paris?" Oyster shells burned in the stove fire, or chalk, or limestone will assist in detaching clinker. We know of no solvent for dried plaster of Paris. Kerosene or benzine will sometimes soften it sufficiently to facilitate its removal.

W. J. H., of Mo.—"If the air be extracted from a case or box and an inclined plane four feet in length, having a grade of one inch to the foot, be constructed within the box, will a ball run down the incline with greater velocity than if the box contained air?" A ball will roll or fall faster in a vacuum, as air offers a resistance.

E. K. P., of N. Y.—"Is there any form of glass prism that will decompose a ray of light into a perfect circle or rainbow of the seven colors instead of the ordinary oblong spectrum?" Yes, let the prism be bent or curved. For a perfect circle use convex lens.

J. B. S., of Wis., asks for the philosophy of the common observation that "it is too cold to snow." We all know that the weather moderates on the fall of snow, and that our coldest days succeed the fall. It is a natural law that bodies in passing from the liquid to the solid state always give out an amount of latent heat. Now snow is frozen vapor, and in its change in the air from the liquid to the solid form, heat is imparted to the atmosphere and its temperature is increased. Similarly, when the snow begins to melt, it draws from the air its latent heat necessary in order to turn from the solid to the liquid state.

J. A., of Me.—The origin of amber is assigned to a resin which flowed from the trunk of certain trees which flourished in the tertiary period. We would refer you to an article on amber and meerschaum published on page 161, Vol. XV.

G. J. L., of Conn.—Bituminous and anthracite coal differ in that the former contains a large amount of pitchy volatile substances which readily ignites and burn with smoke and flame. In the latter these substances by some means have been driven out, and the remainder being a purer variety of carbon burns without smoke or flame.

A. A. L., of Ind., calls attention to a prevalent notion among millers that a water wheel under the same head runs with a greater velocity in the night than in the daytime. "If any explanation is attempted by the workmen, they assert that the air becomes heavier after sunset." We have before us the observations on this very subject made by Prof Cleveland and published in the *Journal of Science*. He selected one fine day in August, and at two o'clock, P. M., the barometer standing at 30·19 inches, the number of revolutions of the wheel was ninety-six in a minute. At midnight the pressure of the atmosphere had increased seven-hundredths of an inch the temperature of the water being the same, the wheel was found to revolve precisely ninety-six times in a minute, showing the same velocity as on the preceding noon. The workmen admitted the truth of the result but seemed to believe that it would have been different on a cloudy night. This matter has been fully discussed in previous volumes of this paper.

## Business and Personal.

*The charge for insertion under this head is one dollar a line.*

For Steam and Gas Fitters Tools, Machines for Hand or Power to Screw and Cut-off Gas pipe; stocks, dies, pipe, vises, Peace's adjustable pipe tongs, address Camden Tool and Tube Works Co., Camden, N. J.

Incrustations removed by Winans' Boiler Powder (11 Wall st., N. Y.), 12 years' use proves it reliable and uninjurious.

Inventors and Patentees wishing to get small, light articles manufactured for them in German Silver or Brass, address Schofield Brothers, Plainville, Mass.

Manufacturers of Ditching Machines of from three to four feet wide by same depth, address M. White, Jr., New Orleans.

County Rights to the Pew Hat Rack for sale. Address E. S. Blake, Pittsburgh, Pa

For Bosom and Collar Plating Machines, Address W. H. Tolhurst, Troy, N. Y.

For Sale—A Valuable Patent Right for the State of New York. For particulars call on or address H. T. Smith, 183 Fulton street, Brooklyn.

Two Valuable Rubber Patents, in the Stationery line, for sale cheap. Address Wm. Burnet, P. O. Box 2,027, New York city.

Parties wishing to contract for first-class Brass and Composition Castings, please address Hidlon & Bond, P.O. Box 733, Biddeford, Me.

For best Post-Boring machines, or anything relating thereto, address B. F. Mohr, Mifflinburgh, Pa. N. B.—The whole Right for sale very low.

Wanted—A good 2d-hand Engine for a side-wheel boat, 18 to 22-inch bore by 42 to 48 inch stroke. An upright with side connections preferred. Apply to Box 670, Sandusky, Ohio, stating particulars. Also, a fire box boiler to match.

## EXTENSION NOTICES.

Frederick G. Schaum, administrator of Frederick Schaum, deceased, of Baltimore, Md., having petitioned for the extension of a patent granted to him the 25th day of April, 1854, for an improvement in glass furnaces, for seven years from the expiration of said patent, which takes place on the 25th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 13th day of April next.

William Baker, of Attica, N. Y., having petitioned for the extension of a patent granted to him the 16th day of May, 1854, and reissued the 22d day of September, 1863, for an improvement in clap board joints, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Albert Fink, of Louisville, Ky., having petitioned for the extension of a patent granted to him the 9th day of May, 1854, for an improvement in bridges, for seven years from the expiration of said patent, which takes place on the 9th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Wm. H. Mitchel, of New York city, having petitioned for the extension of a patent granted to him the 16th day of May, 1854, for an improvement in machinery for composing type, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Edward Brown, of Waterbury, Conn., having petitioned for the extension of a patent granted to him the 16th day of May, 1854, for an improvement in machines for making hinges, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Ward Eaton, of New York city, having petitioned for the extension of a patent granted to him the 16th day of May, 1854, for an improvement in machines for cutting glaziers' points, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

B. J. La Mothe, of New York city, having petitioned for the extension of a patent granted to him the 4th day of April, 1854, for an improvement in railroad cars, for seven years from the expiration of said patent, which takes place on the 4th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of March next.

Benj. A. Lavender, of Halifax, N. C., and Kate Lowe, administratrix of the estate of Henry Lowe, deceased, of Baltimore, Md., having petitioned for the extension of a patent granted to the said Benj. A. Lavender and Henry Lowe the 4th day of April, 1854, for an improvement in treating cane fiber for paper and other purposes, for seven years from the expiration of said patent, which takes place on the 4th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of March next.

Warren Gale, of Peekskill, N. Y., having petitioned for the extension of a patent granted to him the 12th day of September, 1854, for an improvement in straw cutters, for seven years from the expiration of said patent, which takes place on the 12th day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 2d day of June next.

Elias Ingraham, of Bristol, Conn., having petitioned for the extension of a patent granted to him the 3d day of December, 1861, for an improvement in design for a clock case, for seven years from the expiration of said patent which takes place 3d day of December, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 26th day of October next.

## NEW PUBLICATIONS.

LITTLE DORRIT AND OUR MUTUAL FRIEND.

Two more of Peterson's cheap edition of Dickens' works just out. Price of the former 35 cents, of the latter 40 cents. An edition of the Waverley novels in the same cheap style as Dickens' works has been commenced by the same publishers. T. B. Peterson & Brothers, 306 Chestnut st., Philadelphia Pa.

ORATORY.

A handsome 12mo. volume, 220 pages, tinted paper, price $1.50, A clear and succinct exposition of the rules and methods of practice by which readiness in the expression of thought may be acquired, and an acceptable style both in composition and gesture. S. R. Wells, 389 Broadway N. Y.

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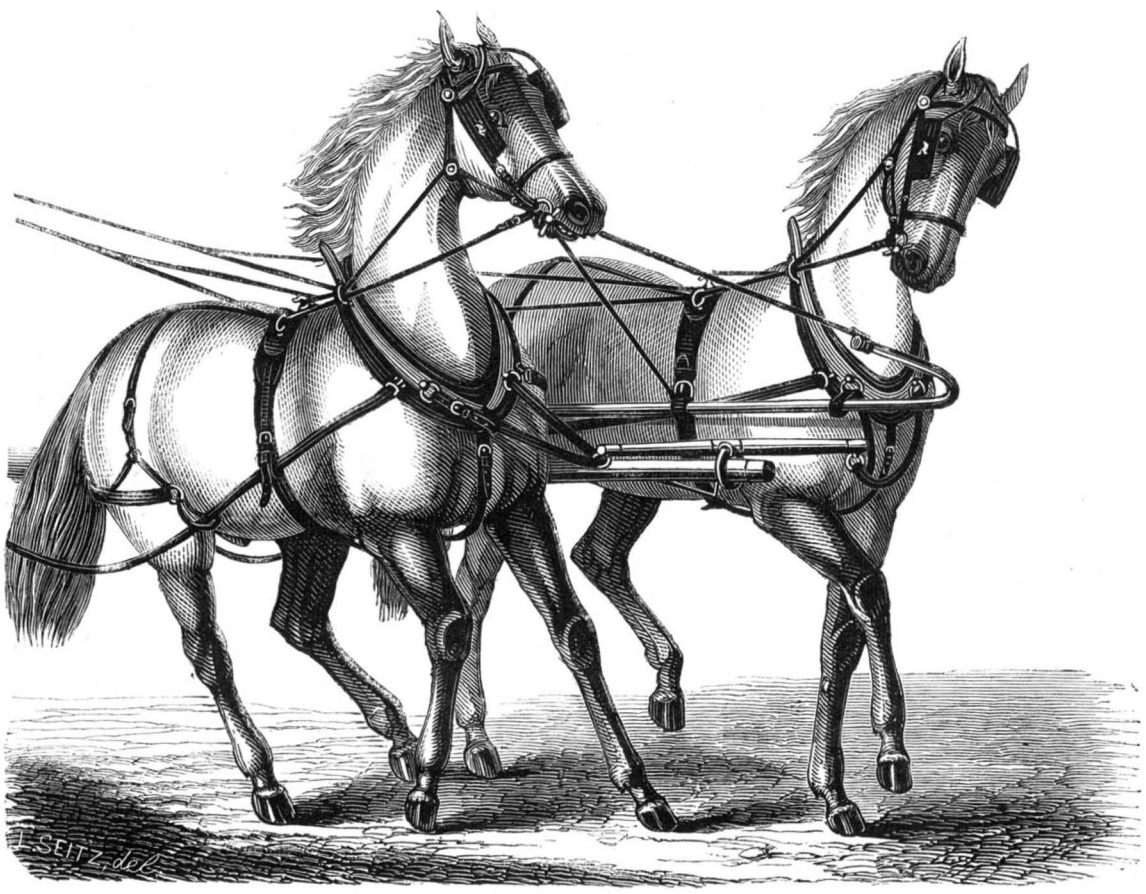
### Method for the Cure of Balky Horses.

In the ordinary harness where two horses are connected as a span, or side by side, it is well known that the horse inclined to balk, as horses are ordinarily harnessed, has really an advantage over the willing horse. He can refuse to draw and not only keeps his breeching tight by his weight, but compels his willing mate to pull the load and himself too. In many cases the balky horse is not maliciously inclined, but is discouraged, and needs only an evidence of sympathy or an exhibition of kindness, or perhaps is ignorant and requires instruction. All of these requisites for the correction of obstinate horses or the education of unlearned animals appear to be furnished by the device shown in the engraving accompanying this article.




BEEBEE'S PATENT FOR CURING BALKINESS IN HORSES AND MULES.

It is simply a rod or pole of wood curved at the front end and secured to that side of the harness of the true horse next to the balky horse. The rod is fastened to the thill strap, side buckle, and hames of the true horse in such a manner that the curved end shall project in front of the head of the balky horse. A stout strap with snap hook or buckle at one end is passed through the first bit ring of the balky horse, under his jaw through the opposite bit ring, then back and fastened to the first bit ring, thus securing the horse's under jaw. The slack of the strap is then fastened securely to the curved end of the rod leaving a length of from nine to fifteen inches, more or less, from the bit to end of the stick. A common hitching strap is now tied to the bit of the balky horse and to the side buckle of the true horse, leaving a foot or more play to the former to prevent his plunging too far forward when the attachment is ready. The action of the fast and loose bit and strap on the under jaw of the balky horse soon reduces him to the condition necessary for driving him.

When the attachment is to be used for a single horse it is made longer and lighter than when for two horses, and is flattened to fit snugly the upper side of the right shaft of the buggy, with two staples attached to the rod, one near the back end and one just forward of the usual hold-back iron on the under side of the shaft. Corresponding staples are affixed to the under side of the shaft and by these and straps the rod is firmly secured to the shaft bringing the curved end to a point about one foot before the horse's head. In this end is set a little pulley and a line from the horse's bridle, attached as in the two-horse plan, passes through the instrument and around the pulley, back through the rings or terrets, thence to the buggy, where it is so attached to the dasher, or forward piece below the dasher, that by means of a little lever with a pulley in it, one third the distance from the bottom end of the lever, it shall shorten the rein double the distance the lever is drawn at that point.

Patented through the Scientific American Patent Agency January 14, 1868, by W. W. Beebee, whom address for further information at Dubuque, Iowa.

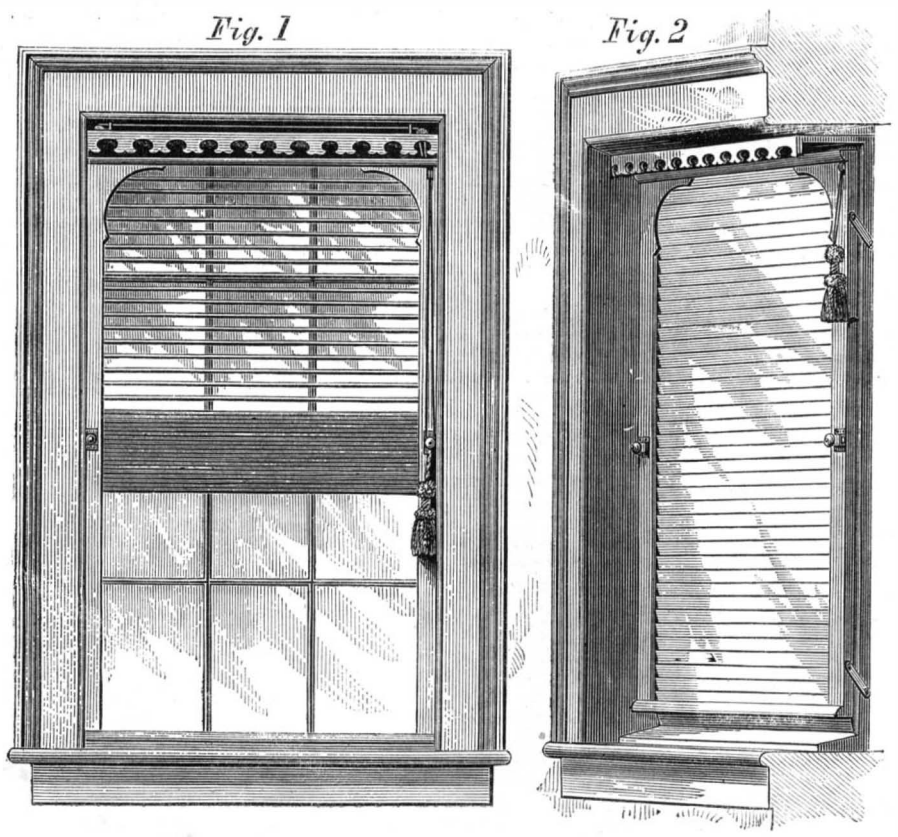
### Improved Window Blinds and Shades.

The Venitian blind has been so extensively adopted in this country that it might almost claim to be American. Whether used on the inside or outside of the window, in combination with shades or curtains, it fulfills the object of precluding the sun's rays and at the same time admitting the air. It is not, however, always convenient to swing an outside blind from the interior, and an inside one as usually constructed is cumbersome.

The object of this invention is to simplify the blind or to combine it and the shade in one device. It can be applied to cars and steamboats as well as houses, and being entirely on the inside can be readily operated. The frame containing the device is of two parts, a fixed and a movable one, seated in the window casing, the uprights of both parts being recessed or grooved to receive the webbing which connects the slats and by which they are suspended. Their ends are connected to the webbing by cords or wires passing through holes in the edges of the slats and through the webbing. A lifting cord runs through central holes in the ends of the slats. one end being fastened under the lower slat and the other passing over rollers at the top of the frame. For convenience the two lines, one at each end, are combined and connected to a tassel at one side, the combined cords passing over a grooved truck seated in the top of one side of the movable frame, as seen in Fig. 1, where the passage of the lines over the top of the frame and their connection with the tassel are plainly shown

Fig. 1 is the blind partially raised as a shade, and Fig. 2 the blind entirely closed. This closing is effected, when the blind is down, by a lifting up of the inner or movable frame, which is hinged by pivoted bars, seen in Fig. 2, to the stationary frame. Small spring catches on the sides of the movable frame may be made to lock into suitable recesses in the window casing to retain it in place at any hight desired.

It is evident that this blind may be adjusted readily to any required position, opened, closed, or held partially closed. It will suit any form or size of window, and does not interfere with the use of draped curtains. It was patented through the Scientific American Patent Agency Dec. 17, 1867, by S. W. Shorey, who will reply to all communications in reference to territorial rights, etc, if addressed at Galesburg, Ill.




SHOREY'S PATENT INSIDE WINDOW BLINDS.

### Preparation of Potash Dyes.

"I take yellow prussiate of potash, or the first crystallization. and dissolve in hot water and make the solution to 20 deg. by Baumé's hydrometer, then pass a stream of chlorine gas through the solution, but not more to be introduced than will prevent precipitation, as may be tested by persulphate of iron, when it is ready to be barreled for shipment or use. In this mode of preparation a larger amount of chlorine is retained which, in the preparation of red prussiate of potash, is dissipated in the process of evaporation and exposure. This loss is by the present new process avoided and by that means a great reduction in labor and cost is effected, and a superior article produced being in value, as yellow prussiate of potash, a saving of nearly seventy-five per cent, in red prussiate of potash, fifty per cent. One hundred pounds of yellow prussiate of potash, or first crystillization, make four hundred pounds of the improved solution." Patented by John Reynolds, San Francisco, Cal.

### Manufacturing Steel by the Use of Oxidizing Salts.

The latest of the many improvements in the steel manufacture consequent upon the discovery of the Bessemer process, is the following invention of Mr. James Hargreaves, which we find described and commented upon in the columns of *The Engineer:*

"Several attempts have been made to use nitrates in converting iron into steel by placing the substances below the level of the bath of molten metal, and thereby causing the oxygen of the other gases evolved by the decomposition under heat to pass up through the metal. Experience, however, showed that the reactions took place so rapidly and with such force as to throw about the metal. But Mr. Hargreaves has fully comprehended the necessity for finding a remedy for the too rapid decomposition of the salts. The salt taken by Mr. Hargreveas is the nitrate of soda, on account of its cheapness and high percentage or oxygen. The most important function of the nitrate of soda would not, however, so much consist in its decarbonizing powers, as in its being an agent 'in removing the metalloids, silicum, sulphur and phosphorous, and the semi-metal arsenic, by forming with them compounds of sodium:' the materials are placed below the fused cast iron, and the products of the decomposition rise up through the fused metal. By taking the nitrate of soda, the quantity of carbon to be removed can be regulated at will by the quantity of nitrate used, and the alkaline residue would 'give rise to the formation of silicate of soda, sulphide of sodium, and phosphide of sodium.'

The first experiments were instituted at the Widnes Foundery. On finding that the oxygen from the nitrate of soda and the chlorates of potash and soda are evolved so rapidly that it was dangerous at once to pour the molten iron upon them, the use of clay as a diluent, and a retarder of the action of the chemicals occurred to Mr. Hargreaves. Its successful action in this way, in its turn suggested the substitution for it of hematite ore. A cheap oxide of iron would thus, while diluting the action of that other chemical, offer an additional supply of oxygen and an increased yield of metal. The nitrate of soda is therefore mixed with a portion of hematite in order to retard its action, and the slightly moist paste thus composed is pressed into the bottom of a vessel lined with fire brick. This paste is then dried into a solid block, either by means of the heat left in the vessel after the last operation, or specially produced. When dry, the molten iron is poured into the vessel, and the layers of the composition scraped up. The high ferrostatic pressure soon carries portions into the mass of molten metal, and the reactions take place between them. The molten metal appears to boil, and a frothy slag, said to contain 'the impurities extracted from the iron,' rises to the top in company with some oxide of iron and compounds of soda. The metal can then be tapped out. In order to be enabled to apply the process of the puddling furnace, and thus employ established plant, he got over the difficulty of the bottom of the puddling furnace being too hot, and hence at once uselessly decomposing the salt, by making the converting materials into hard dry blocks. Several such blocks are successively pushed to the bottom of the molten metal in furnace, the products, of course, rising up as in the fixed vessel. By this means it is said that the puddling operation is shortened, with an attending saving of labor and fuel: and, above all, that the yield is better, from 'the soda forming a base which readily combines with the silicic and phosphoric acids eliminated from the iron.' Mr. Hargreaves states that he can make refined iron for puddling by the use of about three per cent of nitrate and six per cent of peroxide of iron; steel, by eight to ten per cent of nitrate and an equal weight of binoxide of manganese; and malleable iron by eight per cent of nitrate and twenty per cent of peroxide of iron, in each case iron with five per cent of carbon being used. The bulk of the slag produced is materially increased by the presence of the silicate of soda.

NEGLECT of belts, in oiling, "taking up," and their general management, is a prolific source of expense in manufactories and shops. The eye of the manager should often be directed to the belts, their running, condition, etc. It will save time, expense, and trouble.

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## CANDLES FOR CARS---THE KEROSENE SCARE.

For the same reason, we presume, that "misfortunes never come singly," and a striking exemplification of that old adage, is the fact noticed by journalists and observing newspaper readers, that certain months of the year are particularly prolific of railroad casualties. The periodic return of this smash-up season, as it may be termed, is even predicted by enterprising journalists, and it must, so they affirm, like the dog days, run through a certain course before it finally dies out. If, for causes beyond our ken, certain months of the year are peculiarly favored in this respect, it is evident that such a season is now upon us, for the record of the past few months shows a long list of railway casualties of all kinds and of all degrees of horror. Many of these accidents have been the destruction of passenger cars by fire, and in some way the public have become possessed with the idea that kerosene oil lamps have in the majority of cases been the cause of these disasters. The papers have been instrumental in disseminating this belief, and behold, as the result, news reaches us from all points that the managers of the leading railroads of the land have caused the removal of the lamps from all their cars, the popular substitute therefore, being the more primitive source of illumination—candles. Even Legislative action has been taken in some States requiring, under a heavy penalty, all companies running roads through these States to do likewise. We know that several railway-supply establishments in this vicinity are overwhelmed with orders for car-candle burners. Now, if the oil lamps are really so dangerous as represented, and no better substitute can be found, then the sooner a return is made to the era of tallow dips—or any improvement thereof—the better.

In the first accounts received of the Angola tragedy, appeared a statement to the effect that the horrors of the disaster were much increased, if not mostly caused, by the oil from the broken lamps being ignited and scattered over the victims. When the actual facts in the case were made known, it appeared that no kerosene was used in the cars, but candles were employed in lighting them. Again: the lamp which lately exploded in a car on the Erie road, an exchange assures us, was not filled with kerosene, but with a mixed oil requiring a special construction of lamp for burning it. Last week we referred to the burning of the Pullman palace car, "City of Chicago," on the Chicago, Burlington and Quincy railroad. Since that brief account was written, additional particulars have been received, from which it appears that the affirmed cause of the fire was a merely suppositious one, the more probable explanation attributing its origin to the over-heating of a stovepipe near the roof. The officers of the road now feel confident that the latter was the true cause, yet they seem to have become affected by the anti-kerosene movement, and with a remarkable but uncalled for display of prudence, they have ordered all their passenger cars to be provided with candles. Although kerosene oil in this case was not the cause of the conflagration, yet, as it might have been, the remaining palace cars are to be refitted, and all new ones will hereafter be furnished with candles.

It cannot be denied that the light furnished by kerosene oil is superior in its illuminating power to any other equally convenient source of artificial illumination, and it is equally true that with the exercise of a little care, inexplosive oils can be procured. If the roads would confine their purchases to such oils as will stand the commercial fire test of 110°, not only the best, but, under ordinary circumstances, an entirely safe light for railroad cars would be obtainable. As far as our own experience extends, passenger cars are not sufficiently illuminated. The tediousness of a railroad journey is greatly relieved by a cheerfully lighted car, but while under the present arrangement this consolation is rarely afforded the weary traveler, the return to the use of sperm or whale oil, or even worse still, candles, is a retrograde step, which should not be taken until it can be shown that some superior means of illumination, equally safe, is not practicable.

## OBITUARY.---SIR DAVID BREWSTER.

This distinguished *savant* was born at Jedburgh, Scotland, Dec. 11, 1781, and, at the time of his death, had reached the advanced age of eighty-seven years. He was educated for the Church of Scotland, of which he became a licentiate, and in 1800 received from the University of Edinburgh the degree of M.A. Eight years later he entered upon his literary career as editor of the *Edinburgh Encyclopædia*, a work that occupied him wholly or mainly until 1830. His attention was first directed to the study of optics in 1808, and a work on "New Philosophical Instruments," was published by him five years subsequently. In 1819 he was instrumental in establishing the *Edinburgh Philosophical Journal*, and sometime after, the *Edinburgh Journal of Science*. During the later years of his life he was one of the editors of the *London and Edinburgh Philosophical Magazine*, and a voluminous contributor to the reviews, and to the transactions of various scientific bodies. His special works, besides the one already mentioned, were a "Treatise on Optics," one on "The Kaleidoscope," the "Letters on Natural Magic," and "Life of Sir Isaac Newton."

From his laborious investigations of the subject of Optics, the name of Sir David Brewster will always be peculiarly identified with this interesting branch of physical science. Many of the most brilliant of modern discoveries in Optics were made by him, and particularly are we indebted to his researches for a great part of our knowledge respecting that most curious phenomena in science, the polarization of light. One of his earliest practical inventions was an illuminator for lighthouses, the peculiarity of which was a lens constructed out of successive segments of glass. The well-known toy, the Kaleidoscope, one of the most original optical instruments ever constructed, was of his own devising. It is said that the sensation it excited throughout the community, when first brought out, was astonishing; and people were everywhere seen, even at the street corners, looking at the pleasing wonders it revealed. During the space of three months over 200,000 of these instruments were sold in Paris and London. The invention of the Stereoscope is an honor which he divided with Prof. Wheatstone, but while the latter devised the reflecting stereoscope, the common or lenticular form was originated by Sir David himself.

To the labors of deceased we also owe numerous valuable facts in thermotics and meteorology, resulting from his researches on the mean temperature of the earth and the determination of the isothermal lines. The philosopher had certainly no reason to complain of the ingratitude of the world to its men of science. In 1807 he was made a Doctor of Laws by the University of Aberdeen; the next year obtained his Fellowship in the Royal Society of Edinburgh; received the Copley Medal of the Royal Society in 1815, and soon after became a Fellow of that august body; in 1816 received a grand prize from the French Institute, of which body he became a Foreign Associate in 1849; in 1819 received the Rumford Medals from the Royal Society; in 1831 he received a decoration from the King of Hanover, and the next year was knighted by William IV. At the time of his death he was a correspondent of the Royal Academies of Russia, Prussia, Sweden, and other countries, and a member of every scientific society of any importance in Great Britain.

Not only for his great scientific attainments, but also for his excellent qualities as a man was Sir David esteemed, and his death, while it removes one from the foremost rank in science, will be alike keenly felt in social circles.

## Chemistry of Paint.

Hitherto but very little attention has ever been given to the above subject by our leading chemists, but a work has recently appeared, published by the celebrated Dutch chemist, Mulder, in which a vast amount of useful information on this point is imparted, and much of the mystery connected with the chemical action of the different paints is satisfactorily explained. The starting point of his investigations was an inquiry as to the best material to protect iron from rust. The result has been his rejection of all oil paints as unlikely to answer the purpose, and his conclusion that coal tar contains the best materials for a protecting coat. The author very completely investigated the nature of paint, and the chemical changes involved in the drying of oils. As regards linseed oil, we are told that the essential constituent is "linolein," a compound of glycerin and linoleic acid. The latter body the author could not obtain quite pure, but he decides that its formula is HO, $C_{32}H_{27}O_3$. When exposed to air linoleic acid rapidly oxidizes, first to "linoxic acid," a sticky body resembling turpentine. On longer exposure, "linoxyn" is produced. This is a tough leathery substance, sharing, we may say, many of the properties of caoutchouc. It is soluble in the same menstrua, and can be vulcanized like india-rubber. It is manufactured in considerable quantities in this country, and is the binding material used to consolidate emery wheels. It forms also the surface of linoleum cloth. According to Mulder, there are two linoxyns, the white and red; the white modifications become red on exposure to 80° Centigrade, and the red again turns white on exposure to sunlight. The browning of white paint in dark places the author ascribes to the gradual change of white linoxyn into red. Oxidation does not end with the production of linoxyn. It still proceeds to the complete decay of the material, as is seen in very old paint.

One useful result of Mulder's labor is a simple process for preparing a good colorless drying oil. For this purpose it is only necessary to boil linseed oil for two hours with three per cent of red lead, filter it, and then expose it to sunlight in large shallow vessels, frequently renewing the air above. Another result is a denial of the existence of albuminous and gummy matter in linseed oil, to which are ascribed the slowness of drying of unboiled oils. For these matters Mulder searched in vain, and at last came to the conclusion that they had no existence. Oxides and acetates of lead, he tells us, act as driers, not by precipitating albuminous matters, but by forming a little linoleate of lead, which rapidly oxidizes and communicates its activity to the oil.

## Cast-steel Boilers.

The use of steel in the manufacture of steam boilers is of comparatively recent date, and the relative advantages, if any, over ordinary iron boilers, except on the score of their less weight, has hardly yet been satisfactorily determined. We have before us perhaps the latest information bearing on this subject, being the results of an important series of experiments made recently at the rolling mills of Messrs. Funk & Elbers, of Hagan, Prussia, for the purpose of ascertaining the respective evaporating power of the new compared with the old style of boiler.

The two boilers experimented with were each five feet in diameter, and thirty-four feet long, constructed to stand five atmospheres "over" pressure. One was made of wrought iron, and the other of soft cast steel. The thickness of the sides in the cylindrical portions of the iron boiler was 0·50 of an inch, and of the cast-steel boiler 0·33 of an inch. Each boiler had a heating surface of 293 square feet, and twelve square feet of surface. Both were new, and had never been before heated. They were set alike in brickwork, one above the other, but entirely separated by masonry; the gaseous products of combustion passed through a single flue underneath each boiler, and passed directly into the same chimney. At first both boilers were filled, and fires were kept under them for several days in order to dry the brickwork, after which the fires were extinguished and the boilers emptied and cleaned. Each boiler then received exactly 712 cubic feet of water at 95° Fah. temperature; the man-holes were closed, and the water was heated to the boiling point; again the fires were put out, and all the ashes and coals taken away. From this point the boilers were fired afresh, and fed with weighed fuel; the man-holes, hitherto kept closed, were now opened to let the steam escape; and the firing was so well regulated, by means of dampers, that the velocity of the escaping steam—measured by List's Velocimeter—was the same in each boiler. The temperature of the gases from the fire was measured, at a point six feet from the rear end of each boiler, by Gauntlett's Pyrometer, and found to vary from 644° to 734° Fah.

After consuming on each grate 3,150 pounds of coal of the same quality, the cinders of which were burned over and over again, the fires were put out, and the man-holes closed. On the following day the remaining water of the boilers, showing a temperature of 95°, was let out through the emptying tube, situated at the lowest part of the boiler, and measured by means of a hydrometer adapted to the tube. The iron boiler showed 387 cubic feet, and the steel boiler 331 cubic feet of the remaining feed water. Therefore the water evaporated in the iron boiler was 712—387—325 cubic feet, or 20,065 pounds; and that evaporated in the steel boiler was 712—331—381 cubic feet, or 23,523 pounds. Hence the evaporating capacity was proved to be 17·20 per cent in favor of the steel boiler. One pound of coal evaporated in the iron boiler 6,350 pounds of water, and the steel boiler 7,467 pounds of water at 212° Fah.

At the next trial the whole operation was performed in the same manner, only the velocity of the escaping steam was less. It resulted in showing 19·62 per cent in favor of the steel boiler. One pound of coal evaporated in the iron boiler 5,809 pounds, and in the steel boiler 7,008 pounds of water.

These two experiments were verified in the following manner: To an equal quantity of feed water in each boiler an equal volume of a strong solution of salt was added. After stirring the water for some time, by means of long poles, and boiling it with closed man-holes, samples were taken out for future analysis. In completing this experiment in which equal quantities of fuel and water were used, further samples were taken out. The analysis of the samples by Dr. List, of Hagan, showed that in the iron boiler one quart of water contained before evaporation 4,629 grammes of chloride of sodium, and after, 5,985; in the steel boiler one quart contained 4,371 grammes before, and 7,385 grammes of salt after evaporation; the iron boiler lost 33·76 quarts, and the steel boiler 40·81 quarts of water, showing 20·85 per cent in favor of the latter. The average percentage of these three experiments is 19·24 per cent in favor of the steel boiler, which it will be noted had a shell 33 per cent thinner than that of the wrought-iron boiler.

COLOR OF THE CLOUDS.—The varied colors which the clouds assume at various times especially at sunrise and sunset, are explained by Mr. Sorley on the principle that the clear transparent vapor of water absorbs more of the red rays of light than of any other, while the lower strata of the atmosphere offer more resistance to the passage of the blue rays. At sunrise and sunset the light of the sun has to pass through about 200 miles of atmosphere within a mile of the surface of the earth in order to illuminate a cloud a mile from the ground. In passing through this great thickness the blue rays are absorbed to a far greater extent than the red, and much of the yellow is also removed. Hence clouds thus illuminated are red. When the sun is higher above the horizon, the yellow light passes more readily and the clouds become orange, then yellow, and finally white. Clouds in different parts of the sky or at different elevations often show these various colors at the same time.

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## FIRST NEW ENGLAND IRON WORKS.

The first works for smelting iron ore in this country were erected in 1619, on a branch of the James river, Va., but were destroyed by hostile Indians in 1622. Bishop's "History of American Manufactures," says, that in November, 1637, the General Court of Massachusetts granted to Abraham Shaw one half the benefit of any "coles or yron stone which shall bee found in any comon ground which is in the countrye's disposing."

Discovery was early made at Saugus, or Lynn, of the Bog Iron ore, which is deposited in numerous peat bogs throughout Eastern Massachusetts, and supplied the early furnaces of that colony; considerable quantities of this were found in different places within a mile or two of Lynn, and the first attempt to manufacture iron in New England was made in that town. The great scarcity of iron ware and tools, and of iron for ship building and the erection of mills and dwelling houses; with a lessened intercourse between Great Britain and the Colonies, led Messrs. Thomas Dexter, Robert Bridges, and other enterprising persons, to form a plan for the introduction of the manufacture in the colony. With this view, Mr. Bridges, in 1643, took to London some specimens of ore from the ponds of Saugus. In connection with John Winthrop, Jr., who had preceded him thither two years before, a company was formed, called the "Company of Undertakers for the Iron Works." It consisted of the following gentlemen of wealth and enterprise, viz.: Lionel Copley, Esq., of York, England, Nicholas Bond, Thomas Pury, John Becx, W. Beauchamp, Thomas Foley, William Greenhull, Thomas Weld (minister), John Pococke, William Beck, William Hickocke. The sum of one thousand pounds was advanced for commencing the work, with which Mr. Winthrop, accompanied by a corps of workmen, returned to New England the same year. Preparations were immediately made for the manufacture of iron on a large scale, contemplating not only the smelting, but forging and refining of the metal. The General Court was applied to for encouragement and participation in the business. The design was approved of, but the state of the public treasury did not warrant the Assembly in taking stock in the company. Two or three private persons joined the enterprise, and the General Court granted them, March 7, 1643-4, nearly all their requests, including the exclusive privilege of making iron for twenty-one years, provided they made, after two years, sufficient iron for the country's use. They were allowed the use of any six places not already granted, on condition that they set up within ten years a furnace and forge in each place, "and not a bloomery onely." The undertakers and their agents were exempted from all public charges and taxation upon their stock, and themselves and workmen from trainings.

A grant had been previously made in town meeting, 19th of 11th mo., 1643, to Mr. Winthrop and his partners, and to their assigns forever, of about 3,000 acres of the common land at Braintree, "for the encouragement of an iron work to be set up about Monotcot river." This grant was not surveyed, however, and was not laid out till January, 1648. It was long a subject of doubt whether the first forge was at Braintree or at Lynn. Lewis, the historian of the latter town, however, asserts positively that the first works were erected at Lynn, on the west bank of the Saugus, upon land purchased of Thomas Hudson, near a chain of small lakes abounding in ore. The village was called Hammersmith, after the native town in England of several of the principal workmen. Large heaps of scoriæ point out the site of one of the most important, though for various reasons not very successful, undertakings of early colonial times. Operations were continued with variable success for over one hundred years. Mr. Winthrop was ever a benefactor of his adopted country, and several of the workmen whom he introduced in connection with these works were not only of eminent service in laying the foundation of New England enterprise and skill, but left a posterity which has been identified with the manufacturing prosperity of different States to the present day.

In response to several additional propositions from the undertakers, the Court, on 13th November, 1644, granted them three years for perfecting the work and furnishing the country with all sorts of bar iron, provided inhabitants might become proprietors by paying within twelve months £100 each, and an allowance to the adventurers for £1,000 already disbursed, and that they, "with all expedition, prosecute said works to good perfection, as well the finery and forge as the furnace, which is already set up, that so the country may be furnished with all sorts of barr iron for their use at £20 per tun." A grant of three square miles of land was at the same time made them in each of the six places they might occupy, etc. On the 14th May following, the records state that, "whereas it is now found by sufficient proof that the iron worke is very suceessful (both in the richness of the ore and the goodness of the iron), and like to be of great benefit to the whole country, especially if the inhabitants here should be interested therein in some good proportion (one half at the least)" etc. They were invited to take stock in the business. Twelve to fifteen hundred pounds had then been expended, the furnace built, a good stock of mine, coal, and wood provided, and some tuns of sow iron cast, and some preparations had been made for the forge. About £1,500 were required to finish the forge, which was to be paid to Mr. Henry Webb, of Boston, subject to the direction of the undertakers, John Winthrop, Jr., Major Sedgwick, Mr. Henry Webb, and Mr. Joshua Hewes. Colonists were about this time publicly notified that they could join the enterprise if they wished. The partners above named were probably of the number who united with the company in America. Mr. Webb came from Salisbury, England, in 1638, and afterward became a wealthy merchant of Boston. He was a large proprietor in the iron works, and was distinguished for enterprise and benevolence. In October of the same year, a charter with ample privileges, embodying the previous grants and conditions, was made out and delivered to the undertakers, under the public seal of the colony. It confirmed to the company the monopoly for twenty-one years of the sole privilege of making iron and managing all iron mines they might discover, and granted them all waste lands not appropriated, the use of all wood, timber, etc., to convert into coals and earth stones, clay, etc., for the use of the works, forges, mills, or houses built, or for making or molding any manner of guns, pots, and all other cast iron ware, and for converting wood into charcoal, etc., etc. They were allowed to export any surplus to any part of the world except to enemies.

On the 29th September, two days previous to this grant of privileges, the first purchase of lands, consisting of twenty acres, for a forge at Braintree, was made from George Ruggles by Mr. Thomas Leader, who came from England as general agent of the company. The precise date of the erection of the forge at Braintree we do not find stated, but it followed soon after the other. Mr. Winthrop, on 29th May, also received permission to make a plantation and lay out a site for iron works at Pequod (New London)—to which place he removed in 1646—provided he could find suitable persons to effect it within three years. The works both at Lynn and Braintree belonged to the same company.

Johnson, a contemporary, in allusion to the enterprise, speaks only of the latter place, and quaintly refers to some of the difficulties experienced at the outset. "The land affording very good iron stone, divers persons of good rank and quality in England were stirred up by the providential hand of the Lord to venture their estates upon an iron worke, which they began at Braintree, and profited the owners little, but rather wasted their stock, which caused some of them to sell away the remainder, the chief reason being the high price of labor, which ordinarily was as much more as in England, and in many things treble; the way of going on with such a work here was not suddainly to be discovered, although the steward had a very able eye, yet experience hath outstript learning here, and the most quick-sighted in the theory of things have been forced to pay pretty roundly to Lady Experience for filling their heads with a little of her active after-wit; much hope there is now (1651) that the owners may pick up their crumbs again if they be but made partakers of the gain in putting off England commodities at N. E. price; it will take off one third of the great price they gave for labor, and the price of their iron it is supposed another third is taken off; the abundance of wood had for little will surely take off the residue, besides land at easie rates, and common land free for their use." It was the desire of the rulers, he states, to protect the company from loss at any sacrifice. The court, however, in reply to a letter from the proprietors in 1646, acknowledge the importance of the manufacture to the country, both for domestic supply and for exportation, but as an axe at 12d. was none the cheaper to him who had not 12d. to buy it, "so if your iron," they add, "may not be had heere without ready money, what advantage will that be to us if wee have no money to purchase it." The scarcity of specie is said to have been a principal difficulty in its management, and caused the business a few years after to pass into other hands. In August, 1648, Gov. Winthrop wrote from Boston to his son at Pequod, in relation to it: "The iron work goeth on with more hope. It yields now about seven tuns per week, but it is most out of that brown earth which lies under the bog mine. They tried another mine, and after 24 hours they had a sum of about 500, which, when they brake, they conceived to be a fifth part silver. There is a grave man of good fashion now come over to see how things stand here. He is one who hath been exercised in iron works." On 30th September he again wrote, "Mr. Endicott hath found a copper mine in his own ground. Mr. Leader hath tried it. The furnace runs 8 tuns per week, and their bar iron is as good as Spanish. The adventurers in England sent over Mr. Dawes to oversee Mr. Leader, etc., but he is far short of Mr. Leader. They could not agree, so he is returned to Teneriffe."

The iron works at Lynn involved heavy outlays on the part of the company, the majority of whom were too distant to exercise a proper supervision. They consequently yielded but little profit. They were several times assessed for damages to neighboring property by overflow of the pond, and in 1671 the dam was cut away, after which they were conducted on a smaller scale. In the hands of the old company they were more than once attached for debt, and suits were frequent against the proprietors. In 1677 they became the property of Samuel Appleton, who sold them about ten years after to James Taylor, who, we believe, was the last proprietor. They were not finally abandoned until the lapse of over a century from their commencement.

## Spontaneous Combustion in Theaters.

In No. 5, current volume, we published a few facts in regard to the circumstances under which spontaneous combustion may take place. A correspondent of the *Pall Mall Gazette* says:

"I was lately conversing with one of our most eminent scenic painters upon the late catastrophe at Her Majesty's Theater, and he gave his decided opinion that the accident proceeded from spontaneous combustion. He stated that large heaps of the debris and refuse of the painting and property rooms were often swept up together, and left to accumulate for years, and that he had often had reason to complain of this practice, and to point out the danger of it. He related one instance in which such a heap had stood in a theater for a long period, and after many complaints he induced the authorities to remove it, and the moment a spade was thrust into it it burst into flames. I see that in the *Times* a correspondent puts aside spontaneous combustion because scene painting is done with water color, which is not inflammable; but the danger, though sometimes existing even in the painting room, lies more particularly in the property room, where varnish and oil colors are largely used, and where scraps of oiled rag, tow, varnish, sawdust, and flue, or fluff, are swept up, together with other matters. This only requires to be damped, as is not an uncommon practice, for the purpose of laying the dust, to induce eventually spontaneous combustion. My informant also pointed to the case of Astley's Theater, which he stated was burnt down somewhat in this way, from the sweeping of the sawdust and stables; and from his experience, which is very great, he felt certain that many other theaters had been so burnt."

## Ventilation.

The great importance of ventilation in our sitting and sleeping rooms, in our schools and public halls, is not sufficiently appreciated. It was well set forth in a recent lecture by a Cleveland professor. It is startling to learn the amount of carbonic acid emitted from the lungs of one person, or from a single gas burner; enough to poison the whole atmosphere of a good sized room in a very brief period of time. How many persons think that winter temperature demands the exclusion of fresh air to make their apartments warm and comfortable, when the fact that in the cold season we consume more oxygen, and consequently exhale a greater quantity of the poisonous carbonic acid gas, should lead to a directly opposite course. A bed room in winter requires more ventilation than in summer, and the non-observance of this fact will readily account for the awful diseases to which frail humanity is subject.

We wonder if many of our readers are aware of the poisonous exhalations incident to a congregation of their "fellow citizens," in ball rooms, churches, and lecture halls. If they have not fully considered the vast importance of thorough ventilation, let them take these undeniable facts home to their serious thoughts. A person in health has eighteen breathings per minute, and thirty-five hogsheads of air pass through the lungs in twenty-four hours. Of this, from three to five per cent, or about two and a half hogsheads, is exhaled as carbonic acid gas, and thus one person would render two or three hogsheads of air unfit for breathing again. Let every person anxious for the preservation of his health take care that the windows of the dormitories are dropped a little, even during the winter nights. There is far less danger of taking cold than there is of inhaling the noxious atmosphere, which saps the health, undermines the constitution, and embitters life with suffering and disease that might have been avoided. —*Exchange.*

# OFFICIAL REPORT OF PATENTS AND CLAIMS

## Issued by the United States Patent Office,

FOR THE WEEK ENDING FEBRUARY 18, 1868.

*Reported Officially for the Scientific American.*

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

| | |
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| On filing each Caveat | $10 |
| On filing each application for a Patent, except for a design | $15 |
| On issuing each original Patent | $20 |
| On appeal to Commissioner of Patents | $20 |
| On application for Reissue | $30 |
| On application for Extension of Patent | $50 |
| On granting the Extension | $50 |
| On filing a Disclaimer | $10 |
| On filing application for Design (three and a half years) | $10 |
| On filing application for Design (seven years) | $15 |
| On filing application for Design (fourteen years) | $30 |

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ *Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

74,476.—LUBRICATORS FOR AXLES, AND MODE OF ATTACHING THEM TO AXLES.—Levi Adams, Amherst, Mass.

I claim, 1st, The two jaws, E E, fitted or secured to the axle, as shown, in combination with the collar, C, at the inner end of the arm, B, and the flange a, at the inner end of the box, D, all being constructed and arranged substantially in the manner as and for the purpose set forth.

2d, The packing, i, and the oil cup, F, in combination with the jaws, E E, the collar, C, on the axle, and the flange, a, on the box, D, all arranged substantially as and for the purpose specified.

3d, The button consisting of metal plate, d, rod, e, pivoted in lug, f, and the nut, g, when used in combination with the jaws, E E, and all arranged substantially in the manner as and for the purpose set forth.

74,477.—HIGH AND LOW WATER ALARM FOR STEAM GENERATORS.—Thomas P. Akers, New York city.

I claim, 1st, The employment of two weights, of greater specific gravity than water, inside of a boiler, said weights being arranged so as to be subject to the action of high and low water within the boiler, substantially as described.

2d, A combined high and low water indicator which is controlled by weights of greater specific gravity than water, applied upon the unequal arms, of a lever which is hung within the boiler, in such a manner that, while the weight upon the longer arm shall so far preponderate as to open a valve at certain points of either high or low water, such preponderance will be counteracted by the water when at any intermediate point, substantially as described.

3d, The combination of the steam whistle, F, alarm valve, d, vibrating lever, G, and weights, J J', of greater specific gravity than water, arranged within a boiler, substantially as and for the purpose described.

4th, The combination of the lide step, b, valve rod, D, with its valve, and the projection, l, of the lever, G, substantially as and for the purpose described.

5th, The combination of the slide step block, b, valve rod, D, and the adjusting device at the top of said rod, substantially as and for the purpose described.

6th, The devices, L T R, or their equivalents, constructed substantially as described, in combination with the safety valve and the steam whistle, for the purpose set forth.

74,478.—MUZZLE LOADING ORDNANCE.—Frederick W. Alexander, Baltimore, Md. Antedated Feb. 6, 1868.

I claim the apparatus termed a caliber diminisher, for the purpose of diminishing the caliber of smooth bore or rifled guns after they have been loaded, thus preventing any windage of the ball, and capable of being withdrawn after firing, for a fresh load, and of reinsertion, etc., as heretofore described.

74,479.—SPRING CUP TOY.—Horace B. Ames, Great Barrington, Mass., assignor to John S. Stone, Monsatonic, Mass.

I claim the toy ball and elastic spring cup, formed as specified, as a new article of manufacture.

74,480.—SAFETY VALVE.—Horatio Anderson, Chicago, Ill.

I claim, 1st, The case, U H, arranged with holes, o x, lugs, B B, dome, L, flange, K, and stop, f, substantially as and for the purpose herein described.

2d, The holes, o, in combination with the plate, M, substantially as and for the purpose set forth.

3d, The combination of lever, t, pivot top, E F, and stop f, substantially as set forth.

4th, The combination of the nuts, G J, spindle, P, valve, R, and spring, S, as and for the purpose set forth.

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74,481.—TINNERS' DIE.—P. W. Armstrong, Logan, Ohio.

I claim, 1st, Adjustable annular dies, F and G, in combination with the fixed dies, D and E, of a tinner's swaging machine, substantially as and for the purpose herein set forth.

2d, A folding device, H, in combination with the dies, F and G, and constructed and operating substantially in the manner and for the purpose herein set forth.

74,482.—PESSARY.—Benjamin Atkinson, Davenport, Iowa.

I claim a pessary consisting of the hinged leaves, g, arms, c, with the stem, e, attached to the leaves, g, by the rubber strip I, and operated by the screw stem, b, all constructed and arranged substantially as described.

74,483.—SEPARATOR SIEVE.—Joseph Barker (assignor to himself and Alonzo Kinyon), Amboy, Ill.

I claim a double sieve for separating seeds, of coarser and finer netting, having the sides of the same so shaped as to incline the sieve to the shoe, in fanning mills, said sides being provided with the strips, a, or their equivalent, substantially as shown and described and for the purposes set forth.

74,484.—PADLOCK.—Ashbel P. Barlow, Claremont, N. H.

I claim the method of applying the springs, d d d d, in combination with the shell or drum, f, and key, I, in fig. 2, substantially as herein set forth.

74,485.—CHURN DASHER.—J. W. Barton, Clifton Springs, N. Y.

I claim the arrangement, as a whole, of the jointed cross piece, B, standard, A, ways, c c, open and closed dasher wings, E G, rods, D D, and lever, C, the several parts being so combined as to form one connected working apparatus, as and for the purpose herein set forth.

74,486.—HEAD BLOCK FOR SAW MILLS.—Herrick Batchelder, Reading, Mass.

I claim securing the inner end of one of the dogs, D, to a movable block E, as and for the purpose set forth.

Also the wedge, H, in combination with the block, E, and its dog, D, operating substantially as and for the purpose described.

74,487.—BEEHIVE.—Daniel S. Bear, Toledo, Iowa.

I claim the open bottomed boxes, B B, constructed as described, having their inner and upper sides formed of slats, c c, said boxes fitting over the double inclined bottom, A, and adapted to be removed separately, from opposite sides of the hive, as herein described, for the purpose specified.

2d, The boxes, B B, constructed and operating as described, in combination with the double inclined bottom, A, slotted honey board, E, cap, C, and surplus honey boxes, D, when the sides of said boxes, B B, are adapted to fit over the edges of the inclined bottom upon the projecting sleepers, b, as herein described, for the purpose specified.

74,488.—GEARING.—Asa M. Beard, Hillsboro, N. H.

I claim for the purpose specified, in the construction and arrangement of a pair of meshing gears, dividing one gear in a plane square to its axis, and fixing one part on its shaft, while the other part is attached to said shaft by a spring, which operates to turn said part or its shaft with reference to each other.

74,489.—WOOD SCREW.—Jason A. Bidwell, East Boston, Mass.

I claim as a new and improved article of manufacture, a wood screw having its core tapering from its shank to its entering point, and provided with a thread of uniform diameter, as herein described.

74,490.—SCREW DRIVER AND BORING TOOL.—Jason A. Bidwell, East Boston, Mass.

I claim, 1st, The construction of a screw driver which is adapted for driving perforated head screws, with cutting edges formed on a pyramidal point, in combination with scores or grooves, e, for conducting out of the hole the chips or dust, while in the act of boring, substantially as described.

2d, As a new and improved article of manufacture, a tool having a rectangular tapering point, c, a rectangular straight shank, a, and an adjustable countersink, b, said tool being adapted to serve the threefold purpose of a screw driver, a boring tool, and a countersink, as herein set forth.

74,491.—WAGON JACK.—Michael Biglin and Daniel W. Bennett, Wilkesbarre, Pa.

We claim the entire form of the "wagon jack," and more particularly the faced lifting block or follower, marked D, and lever, C, as constructed and operating substantially as described.

74,492.—SEWING MACHINE.—Thomas M. Bradley, Chesnut Level, Pa.

I claim, 1st, The arrangement and combination of the upright lever, D, with its curved arm, C, the plate, H, the needle bar, J, and the wheel, A, as herein described and for the purposes set forth.

2d, Also the movable hammer, W, inclined lever, Z, and pivoted shuttle box, a, as combined and operated by the upright lever D, as herein described and for the purposes set forth.

74,493.—SKID FOR ELEVATING AND LOWERING BARRELS, ETC.—Clarence Brosius, Hancock, Md.

I claim the skid, slide, and stays, as described and set forth.

74,494.—FOLDING BEDSTEAD.—S. S. Burr, Dedham, Mass.

I claim the combination with the upright case or false cabinet, of a folding bedstead, hinged to the rear of the same, and constructed as herein described, so that when folded up its head board shall constitute the cap or cornice of the cabinet, substantially in the manner shown and set forth.

74,495.—CORKSCREW.—John Bussey (assignor to himself and John F. Gunkel), Cincinnati, Ohio.

I claim the arrangement of the lever, K, catch, G, and spiral spring, J, within the handle, E, for the purpose of detaining and releasing the spiral shank, B, of the corkscrew, A, and enabling the said catch to be actuated by the thumb of the hand by which the instrument is worked, substantially as described and represented.

74,496.—COMBINED CORN PLANTER, SOWER, REVOLVING HARROW, AND CULTIVATOR.—W. P. Byler, Leavenworth, Kansas.

I claim, 1st, The revolving harrows, E, made adjustable, so as to be contracted and expanded, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the harrows, E, vertical shafts F, bevel gear wheels D and I, axles, B, and wheels, A, with each other, substantially as herein shown and described and for the purpose set forth.

3d, The combination and arrangement of the vertical shaft, F, slide bar, L, chain, P, pulley, Q, lever pawl, O, curved rack, N, and slide or guide bars M, with each other, substantially as herein shown and described and for the purpose set forth.

4th, The combination of the adjustable support, J, and spring catch, K, with the vertical shaft, F, bevel gear wheel, I, and frame, C, substantially as herein shown and described and for the purpose set forth.

5th, The combination and arrangement of the slide, S, lever, T, spring, X, connecting rod, U, and bent or foot lever, V, with each other and with the seed box, R, and frame, C, substantially as herein shown and described and for the purpose set forth.

6th, The combination of the bent lever, H', and curved rack, I', with the slotted end of the pivoted tongue, G,' and with the frame, C, substantially as herein shown and described and for the purpose set forth.

74,497.—SCROLL SAW.—B. J. Camp, Mar on, Ohio.

I claim the up-and-down adjustable guide bar, G, carrying the bent spring, H, constructed and arranged to operate as herein set forth

74,498.—CHURN.—Daniel H. Carpenter, Hector, and Hiram L. Slaght, Lodi, N. Y.

We claim, 1st, The stationary frame, A, the swinging frame composed of the parts, C E J and D, arranged substantially as described, for the purpose set forth,

2d, The fulcrum pin, i, slot, k, connecting rod, l, shaft, H, with the friction rolls, f, in combination with the swinging frame, the whole arranged and operating substantially as and for the purpose described.

74,499.—CARRIAGE SPRING BRACE.—Joseph H. Chadwick, Wheaton, Ill.

I claim the combination and arrangement of the spring, A, the sill, C, or its equivalent, the braces, c d, and jointed arm, f, in the manner and for the purposes set forth an i shown.

74,500.—PUMP.—Taylor Chamberlin and T. Elwood Garrett, Philadelphia, Pa.

We claim, 1st, The hollow shaft and piston, C D, arranged and operating substantially as shown and described.

2d, The combination of the hollow piston and shaft, C D, the discharge chamber, B, and the cylinder, A, substantially as and for the purposes specified.

74,501.—SPIKE.—J. Henry Champlin, Essex, Conn.

I claim the spike, A, constructed with slots or notches, a a a a, cut into the body of the same at its several angles, substantially as described and as and for the purposes set forth.

74,502.—WASHING MACHINE.—Alvin B. Clark and Charles Davis, Richmond, Ind.

We claim, 1st, In combination with wash board, C, or other suitable surface, the roller, a, rotating and sliding at each alternate stroke, substantially as described and for the purpose set forth.

2d, Also the combination of the reciprocating rods, d and d, hangers, b and b', springs, V and V, ratchets, e, and pawls, i, with roller, a, and board, C, all operating substantially as described and for the purpose set forth.

74,503.—WELL BORING APPARATUS.—N. C. Clark, Low Moor, Iowa.

I claim the combination of the hollow perforated stem, F, and a detachable point, G, with the extensible rod or stem, J, auger, E, valves, H, and shell or casing, I, all constructed and arranged to operate in the manner and for the purpose set forth.

74,504.—SCHOOL DESK AND SEAT.—Milton B. Cochran, Davenport, Iowa.

I claim the continuous desk board, b, provided with the rail, g, and shelves or pockets, f, in combination with chairs, a, and iron braces, e e' e'', when constructed and arranged for use as herein described and for the purpose set forth.

74,505.—CHURN.—John T. Coe (assignor to himself and Edward F. Coe), Chambersburg, Pa.

I claim, 1st, A churn dasher consisting of two wings set at any desired angle with each other, said wings being made with sides inclined in opposite directions, as and for the purpose set forth.

2d, The dasher, b, in combination with the band, c, hook, d', and staple, e, substantially as described.

74,506.—MACHINE FOR CUTTING RAGS.—John Collins, Jr., Detroit, Mich.

I claim, 1st, The spring guard, I, feed roller, H, and cutter, E, combined and operating together substantially as described and for the purpose set forth.

2d, The combination of the cutter, E, spring guard, I, and feed roller, H, with the table, A, the driving wheel, B, shaft, C, pulley, D, and wheel, G, all constructed and operating substantially as and for the purpose described.

74,507.—COW MILKING MACHINERY.—L. O. Colvin, N. Y. city.

I claim, 1st, So operating the "milker" that the same may have a vertical or "bunting" movement, substantially as and for the purpose specified.

2d, The pulley, n, and cord, k, in combination with the tube, F, of the milker, and the bent lever, I, substantially as and for the purpose specified.

3d, The bent lever, I, in combination with the pump, D, operating the milker substantially as and for the purpose specified,

4th, The gates or stanchions, B, so constructed and operating as to secure the cow while being milked, and to admit of her passage between them when liberated, substantially as set forth.

5th, An escape valve arranged in relation with the pump, D, and the tube F, of the milker, substantially as and for the purpose specified.

6th, The universal joint, h, arranged in combination with the milker, and the tube, F, thereof, substantially as and for the purpose specified.

74,508.—CURTAIN FIXTURE.—J. M. Corns, Black Rock, N. Y.

I claim the radially corrugated disk, g, in combination with the similarly corrugated bearing, f, spiral spring, h, nut, i, and roller, B, arranged and operating substantially in the manner and for the purpose set forth.

74,509.—CARD SAFE.—Charles S. Crane, Selma, Ala.

I claim the album or card case with an exterior as a picture frame having an interior receptable, the joints, hinges, and entrance concealed from appearance by the moldings, substantially as specified and shown.

74,510.—SEAT ARM FOR RAILROAD CHAIR.—William G. Creamer, Brooklyn, N. Y.

I claim the construction of the pivot plate with its nipple, M, and screw, Q, in connection with the car seat arm, the arm being either plain or recessed to receive the head of the screw or washer, all substantially as described and for the purposes set forth.

74,511.—THREE-WHEELED FARM WAGON.—E. T. Crockett, Guilford, Me.

I claim the hinged draft plate, G, with side arms, J, bound, E, and coupling, C, when constructed, combined and operating with the third wheel, L, as herein described and for the purposes set forth.

74,512.—LIFTING JACK.—A. M. Culver, Bedford, Ohio.

I claim the adjustable legs, B, lever, A, and rod, C, constructed, combined and arranged to operate in the manner as and for the purpose set forth.

74,513.—SYSTEM OF FLAMBEAU-LIKE LIGHTING APPARATUS.—Edmond Armand Louis D'Argy, Paris, France.

I claim, 1st, The combination of the removable reservoir, a, base, d, and cup, f, said reservoir adapted to be inverted for feeding the oil to the cup, as herein shown and described.

2d, The pressure spiral tube, m, for the purpose of preventing the oil inside from being spilt out when the flambeau is turned upside down.

3d, The wooden or equivalent washer, i, in combination with the reservoir, and socket, h, as herein described for the purpose specified.

4th, The combination of the pastils, e, with the base, d, of the flambeau and the pin, c, substantially as described for the purpose specified.

74,514.—BLOWER HOLDER.—J. B. F. Davidge, N. Y. city.

I claim an implement or apparatus composed of two sets of griping jaws and suitable hand pieces, the whole constructed to operate substantially in the manner described for the purposes set forth.

Also the shield, g, in combination with the pivoted griping jaws and hand pieces, the whole arranged to operate as described for the purpose set forth.

74,515.—GRAIN DRILL.—Charles F. Davis, Auburn, N. Y.

I claim, 1st, So attaching the shoes or hoes of a seed planter to the main frame as that by means of a lever, or its equivalent, said shoes may be shifted from a straight to a zig-zag line, or *vice versa*, at pleasure substantially as described.

3d, In combination with a series of shoes or hoes that are capable of being changed from a straight to a zig-zag line, or *vice versa*, the so connecting of said shoes by independent levers to the lifting bar as that they may be raised by the operator individually or as a whole, substantially as described.

3d, Hinging the shoe to both its drag bar and to its individual lever so that the shoe may be raised and lowered in either of its changed positions by a lever that is permanently located, substantially as described.

74,516.—MODE OF SETTING ARTIFICIAL TEETH.—George Lewis Derr, Mifflintown, Pa.

I claim the mode herein described of securing teeth to a metallic plate by straps, B, and pins, c, connected by fusible metal run between and around them, substantially as described.

74,517.—BAG CLASP.—Edmund L. Dickey, Chicago, Ill.

I claim a metallic bag clasp for fastening bags, when constructed and operating substantially as and for the purpose specified.

74,518.—COTTON SEED PLANTER.—Zina Doolittle and A. M. Crowder, Houston Factory, Ga.

We claim, 1st, The adjustable rods, B B, in combination with the slots, a a, in the bottom of the hopper, A, substantially as and for the purpose specified

2d, The oscillating rods, e e', in combination with the adjustable rods, B B, and the slots, a a, all arranged substantially as and for the purpose set forth.

3d, Operating the oscillating rods, e e', through the media of the arms, f, links, f', and lever, D, arranged substantially as herein shown and described.

74,519.—COTTON CULTIVATOR AND CHOPPER.—Zina Doolittle A. M. Crowder, Houston Factory, Ga.

We claim, 1st, The cutters, P, connected to vertical arbors, I, operated through the media of the levers, J J, link, L, lever arm, M, and pins, h, on the wheels, B, all constructed and arranged substantially as and for the purpose herein set forth.

2d, The scrapers, F F, and shares, G G, in combination with the cutters, P P, all constructed and arranged to operate in the manner substantially as and for the purpose specified.

3d, The adjustable draft rod, E, and semicircular bar, D, arranged as shown for the purpose of adapting the machine for one or two horses.

4th, The slide rod, Q, and lever, R, arranged and applied to the device, substantially as and for the purpose set forth.

74,520.—STOVEPIPE DRUM.—Lewis Dowe and Aruna C. Colton, Sycamore, Ill.

We claim, 1st, In a heat deflector, the pivoted slats, B B', in combination with a casing, A, when said slats are connected together and are combined with a device for securing them in position, substantially as described for the purpose set forth.

2d, In combination with a heat-deflecting drum the combination of the arm, C, the spring, a, and the segment, F, substantially as and for the purposes described.

74,521.—SAW.—James E. Emerson, Trenton, N. J.

I claim a planing tooth in which the cutting point, the recessed planing cutter and the gage or guide to prevent the cutters from running into the wood are all formed in or on one and the same piece of steel, substantially as and for the purpose described.

74,522.—SAW.—James E. Emerson, Trenton, N. J., and William S. Winsor, Jamestown, N. Y.

We claim, in combination with a saw plate that is thinner at its edge than at its central portion, the removable and replaceable teeth and planing cutters, substantially in the manner and for the purpose described.

74,523.—SAW.—James E. Emerson, Trenton, N. J., and William S. Winsor, Titusville, Pa.

We claim, in combination with sawing teeth and planing cutters separately attached to and removable on the same saw plate, the support, guide, or gage on the planing cutters to prevent them from running into or taking too rank a hold of the wood, substantially as described.

74,524.—WINDLASS.—Porter Evarts, Madison, Conn.

I claim the adjustably-connected bars, K, to the working lever, I J, by means of loops, k', formed upon the upper ends of said bars, K, and notches formed in the upper side of the working lever, I J, substantially as herein shown and described and for the purpose set forth.

74,525.—BOOT HEEL.—John Fearn, Tompkinsville, N. Y. Antedated February 12, 1868.

I claim the cylindrical screw, b, with or without points, applied from the inside of the heel, whereby the same can be screwed in or out from the inside to compensate for the wear of the heel, substantially as herein shown and described.

74,526.—GRATE BAR.—Addison C. Fletcher, New York city

I claim the alternating conical recesses, n, in combination with the rounded points, e, substantially as shown and described for the purposes specified.

74,527.—SELF-FEEDING PIPE CUTTER.—Moses H. Freeman, Somerville, Mass.

I claim the combination of the bar, A, and the knife, C, constructed and combined as described with mechanism for holding the pipe against and rolling it on the knife while the latter may be turned about the pipe, substantially as specified.

Also the combination of the bar, A, the knife, C, the carriage, D, and the clamp or presser, E, and its adjusting screw, F, or the equivalent of such presser and screw, the whole being arranged and applied together substantially as set forth.

Also the combination of the stationary stop, c, and the spring stop, d, with the bar, A, the knife, C, the carriage, D, the presser, E, and its screw, F, the whole being as specified.

74,528.—SPRING MATTRESS.—August Gebhard, Indianapolis, Ind.

I claim the combination of the hinged frame, A, and its springs with the interior sacking, E, supported by the rods, F, and straps, G, to the side of the frame, as and for the purpose set forth.

74,529.—FARM GATE.—C. Eugene Goodwin, Portland, Mich.

I claim the construction of a gate as herein described with the posts, B and C, the projecting cap, D, the pivot post, E, the horizontal bars, F, the stiles, G and H, the brace, I, the pivot pins, K, the bolts, L, the rod or chain, M, and the revolving catch, N, when arranged and operating substantially as and for the purposes set forth.

74,530.—CARRIAGE FOR ADVERTISING.—William C. Harris, A. Robert Roseman, and Hubbil B. Hutchins, Philadelphia, Pa.

We claim a large skeleton frame having lamps enclosed therein and being supported on wheels or runners so that it can be drawn or driven like a carriage or car through the streets of a town, and having also a long semi-transparent advertising band or canvas curtain arranged around the outside of the said frame so that it can be moved by the driver as a panoramic curtain, the whole being constructed, arranged and operated as herein described and set forth for the purpose specified.

74,531.—BURIAL CASE.—Jasper R. Hathaway, Westfield, N. Y.

I claim as a new article of manufacture a burial case formed of cast-metal plates which are held together by dove-tail joints, substantially as and for the purpose described

74,532.—CAR COUPLING.—John C. Heaton, Fitchburgh, as signor to himself and Nathaniel Earle, Henrietta, Mich.

I claim the combination of the arrow-headed coupling bar, B, lifting plate, C, and operating lever, D, with each other and with the bumper head, A, substantially as herein shown and described and for the purposes set forth.

74,533.—HEMMER, MARKER, ETC., FOR SEWING MACHINE.—W. D. Heyer, New Orleans, La. Antedated February 7, 1868.

I claim, 1st, The hemmer, D, formed with a concentric groove and provided with a roller placed obliquely for keeping the work in the groove, and constructed substantially as specified.

2d, The combination in a single machine of a sewing guide, hemming device, tucking and creasing device, cording device, and quilting guide, constructed and operating substantially as specified.

74,534.—CAR VENTILATOR.—M. T. Hitchcock, Springfield, Mass.

I claim, 1st, Providing a car ventilator with a sliding valve which is forced to the rear end of its case by the draft, substantially as herein shown and described.

2d, The hub, b, of the sliding valve, when constructed as described, so that both a sliding and an oscillating motion can be imparted to the valve, as set forth.

3d, Providing the case or shell, A, in which the sliding valve, D, moves, with elastic abutments, F F, which are so arranged that the valve when striking against one of the abutments will be brought into an inclined position, substantially as and for the purpose herein shown and described.

4th, The shell and case, A, when provided with elastic abutments, F F, in combination with the sliding oscillating valve, D, and with the channel, B all made so that the lower edge of the valve does not come in contact with the bottom of the shell, and all operating substantially in the manner herein shown and described.

74,535.—CANOPY FOR TENT AND BED NETTING.—J. Burt Holmes, Cincinnati, Ohio.

I claim, 1st, The canopy, A, in combination with stretchers, H, and stretcher support, E, when the same are constructed and operate substantially in the manner as and for the purpose herein set forth and described.

2d, The caps, C C', pulley bolt, b, and nut and eye, D, when arranged substantially as specified and for the purpose set forth.

3d, The stretcher support, E, and stretchers, H, constructed as herein shown and specified and for the purpose set forth.

74,536.—FURNACE.—Marcus L. Horton, Worcester, Mass.

I claim the combination as well as the arrangement of the air chambers, D C, and the grate made hollow and with hollow journals so open into such chambers respectively, as set forth.

Also the arrangement of horizontal and vertical pipes or conduits of the fire-proof lining of the fireplace, such pipes being arranged within such lining and made to communicate with each other and the fireplace and with the external atmosphere so that air may flow into and through the pipes and lining and be discharged into the fireplace, as specified.

Also the combination of the system of pipes and air passages in the fire-proof lining with the air chamber, C, partially surrounding the ash chamber and grate and made with a perforated top, as set forth.

Also the arrangement of the hollow grate and its hollow journals, the induction and eduction air chambers, D C, the fire-proof lining, and a system of pipes or air conduits arranged in such lining and made to communicate with the chamber, C, and the fireplace, substantially as specified.

74,537.—LAMP SHADE.—William H. Horton (assignor to himself and Nathan P. Brown), Chelsea, Mass. Antedated December 27, 1867.

I claim the lamp-shade supporter and adjuster consisting of the friction arm, C, the bars, B and D, arranged and applied together and to the shade, as set forth.

Also the combination and arrangement of the fork, E, with the arms, C B D, arranged and applied together and to the shade, A, substantially as hereinbefore explained.

74,538.—HORSE HAY FORK.—David J. Howenstine, Marshallville, Ohio, assignor to himself and Patterson V. Wilkins.

I claim the spiral tines, 1 and 2, attached to revolving shaft, A, in combination with the spiral tines, 3 and 4, attached to the sleeve, B, in combination with latch, E, and rope, F, when arranged and operating substantially as herein described.

74,539.—HORSESHOE.—N. W. Hubbard New York city.

I claim, 1st, The removable toe calks, E, for horseshoes, substantially as shown and described, in combination with the toe plate, G, clamp screw, a, or its equivalent, a lias and for the purpose set forth.

2d, The heel calks for horseshoes substantially as shown and described, in combination with the plates, as shown at B or C, and screws, b or d, all as and for the purpose set forth.

74,540.—CONSTRUCTION OF TAN VAT.—Joseph Huber, Buffalo, N. Y.

I claim a tan vat constructed of strips of board or plank laid up with coal tar and felt packing between the strips and nailed together, in the manner and for the purpose substantially as described.

74,541.—SAW.—Eugene Humphrey, Boston, Mass.

I claim the fastening of a movable or insertable and self-adjusting saw tooth in its recess in the saw plate by means of a slide operating in combination with a recess extending into the plate and tooth, substantially as described, when said slide or recess or both are cut away or varied in width, for the purpose described.

74,542.—LAMP.—John Ingersoll, Cleveland, Ohio.

I claim extending the tube, E, from the top of the lamp down into the hollow stem or shank, D, and so arranged in relation to each other and the globe of the lamp as to form a passage for the oil between the said tube and shank in filling and in burning, substantially as set forth.

74,543.—PRESS FOR PACKING FRUIT.—Thomas J. Jones, Rochester, Mich.

I claim the combination and arrangement of the can-shaped projection, E, with lever, F, rock shaft, D, ratchet wheel, G, pawl, H, posts, C C', floor, A, inclined plane, B, axle, I, and wheels, J J, when operating as and for the purpose herein set forth.

74,544.—NECK YOKE.—Thomas J. Jones, Rochester, Mich., assignor to himself and Lorenzo D. Gillett,

I claim, 1st, The circle, E, and the bars, D D and F, when arranged substantially as and for the purpose set forth.

2d, The hinge bolt, G, when constructed and operating substantially as described.

3d, The combination of the above-named parts with the bar, A, the rings, B B H I I and J J, the guards, C C, all arranged and operating substantially as and for the purposes specified.

74,545.—PICKER FOR LOOMS.—Rufus Joslin, Pawtucket, R. I.

I claim the combination of the picker staff, screw, C, and reversible picker, constructed and arranged substantially as and for the purposes specified.

74,546.—BUTTER WORKER.—Samuel Keen, East Bridgewater, Mass.

I claim, 1st, The paddle or butter worker, H K, when working in the manner substantially as described and for the purpose set forth.

2d, Combining the pieces, D' D'', with the piece, D D'', by the elastic strips, P P', substantially as described and for the purpose set forth.

74,547.—CONSTRUCTION OF SEA WALL.—John Kelly, San Francisco, Cal.

I claim the strips of metal or lead, A C, when placed between the joints of blocks of masonry, substantially as and for the purpose herein specified.

74,548.—EXTENSION LADDER.—John Kerns (assignor to D. M. Sluss and D. M. Slusser), Louisville, Ohio.

I claim the combination of the pawls, I I, pawl axle, H, arm, M, and cord, N, when used in connection with the ratchets, L L, in the part, B, which have irons, Q Q, inserted therein and when the ladder, A, has the slots, S S, all arranged in the manner and for the purposes specified.

74,549.—DITCHING MACHINE.—Jacob King (assignor to himself, James Hamilton and B. Stokely), Indianapolis, Ind.

I claim, 1st, The combination of the side cutters, C C, with the way boards, S S, when the former are constructed with circular recesses to receive the correspondingly rounded forward extremities of the way boards, so as to form a hinge joint, substantially as and for the purpose specified.

The yoke, Y, arranged to slide upon the frame, A, and adapted to change its position in conformity with the adjustment of the cutter beam, N, as and for the purpose specified.

74,550.—HARVESTER CUTTER.—Thomas Knowles, Robert Knowles and Samuel Knowles, Jersey City, N. J.

We claim the fixed knives, C, attached to the finger bar by means of the connecting bar, c, and supporting blocks, b', substantially as shown and described.

74,551.—SETTEE, BED AND TABLE.—Charles F. Kramer, Mondovia, Wis.

I claim the construction and arrangement of the settee, bed and table, when combined and adjusted by the pivoted side levers, K K, and side catches, G and L, as herein described and for the purpose set forth.

74,552.—HARVESTER.—Israel Lancaster, Baltimore, Md.

I claim, 1st, Placing the fulcrum of the reciprocating lever, H d, which is between the points at which the power and resistance are applied to the said lever, upon one side of a vertical line drawn through the driving wheel center and the knife bar upon the other side.

2d, The fulcrum plate, g, constructed and operated as described, and for the purpose mentioned.

3d, The lever, H d, and friction rollers, c c, acting in combination with the cam flange, b b.

4th, The combined spring and bearing, T, constructed and operating as described and for the purpose mentioned.

74,553.—ANIMAL TETHER.—Martin Leonard and Stephen C. Leonard, Oberlin, Ohio.

We claim 1st, An animal tether composed of the yoke A, and crossstrip C, and picking points, e', and shield, D, and springs, a and a', substantially as shown and described and for the purposes set forth.

2d, The pin, B, in combination with the key, d, and the spring, d', substantially as shown and described and for the purposes set forth.

3d, The cross strip, C, and points, e', in combination with the yoke, A, and the perforated sliding shield, D, substantially as shown and described, and for the purposes set forth.

4th, The shield, D, in combination with the springs, a and a', and with the yoke, A, substantially as shown and described, and for the purposes set forth.

74,554.—SULKY PLOW.—Elias Levee, West Point, Ind.

I claim, 1st, The combination of the sliding guard or guide bars, J and K, with the plow beam, A, and with the tongue, F, or frame of the sulky, substantially as herein shown and described and for the purposes set forth.

2d, The combination of the adjustable bar, R, adjustable bent lever, S, and bar or handle, U, with each other, and with the plow beam, A, and support, T, attached to the tongue, F, or frame of the sulky, substantially as and for the purpose set forth.

3d, The combination of the crank journal, g1, slotted support, g2, wheel, I, and axle, substantially as described and for the purpose specified.

74,555.—SAFETY ATTACHMENT FOR UMBRELLAS.—John A. Lieb and E. W. Crane, Newark, N. J.

We claim, 1st, The notched rings, c, and jackets, f, in combination with the stops, e, and runner, B, of an umbrella, substantially as and for the purposes described.

2d, The scalloped edges and ridges, g, in combination with the jackets, f, rings, c, and runners, B, constructed and operating substantially as and for the purpose set forth.

74,556.—CAST IRON SLEIGH RUNNER.—E. W. Lockwood and B. T. Frederick, Marshalltown, Iowa.

We claim, 1st, The U-shaped metal knees, B, provided upon their upper curved sides with the slotted horizontal supports, c, the runners, D, having the shoulder, g, for the reception of the end of the rave, all cast in one piece, substantially as described for the purpose specified.

2d, The metallic knees B, when made V-shaped in their transverse section, and curved vertically to form a brace for the runners, D, and supports, c, substantially as described for the purpose specified.

74,557.—BREACH LOADING ORDNANCE.—Lucius M. Lull and James T. Starr, Walnut Grove, Ill. Antedated Feb 6, 1868.

We claim the breech block or cylinder, B, constructed as herein described and used in combination with a cannon provided with lever, D, chain, C, and bar, E, when constructed in the manner substantially as and for the purposes specified.

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74,558.—PORTABLE CHAMBER CLOSET.—William J. Lyman, East Hampton, Mass.

I claim a portable chamber closet, constructed with the spring platform and funnel, substantially as and for the purpose described.

74,559.—BRAKE FOR VEHICLES.—Horace B. Marshall, Waldoboro, Me., assignor to himself and Samuel R. Bridgham, Hebron, Me.

I claim a brake attachment for four wheeled vehicles, composed of the shaft, D, levers, B, brakes, a, and connecting rod, E, and lever, F, substantially as shown and described and for the purposes set forth.

2d, The sliding main shaft, D, in combination with the bent levers, B, and brake blocks, a, and connecting rod, E, and lever or crank, F, or its equivalent, substantially as shown and described and for the purposes set forth.

74,560.—TOOTH BRUSH.—T. S. Maury, Washington, D. C.

I claim a tooth brush in which the ends of the bristles of which the brush is composed are ground or smoothed and polished, substantially in the manner and for the purposes herein described.

74,561.—EDGE PLANE.—Charles D. McAuley (assignor to himself and Geo. W. Kaylor), Carthage, Ohio.

I claim, 1st, The concave cutting blade, C, the edge being beveled or sharpened on the outside, and having the returned face, b, slotted for the purpose of securing it in any desirable position to the stock, B, substantially in the manner herein shown.

2d, The adjustable gage, D, provided with the slot, e, and guard, d', when secured to the stock, B, or its equivalent, for the purpose set forth.

3d, The stock, B, having the guard, d, and groove, c, in combination with the adjustable gage, D, cutting blade, C, and set scraps, e' and a, when the same are constructed and arranged in the manner and for the purpose herein described and set forth.

74,562.—NEWSPAPER FILE.—Louis P. McCarty, San Francisco, Cal.

I claim a newspaper file, constructed substantially as and for the purpose herein described.

74,563.—LAMP.—S. T. McDougall, Brooklyn, N. Y.

I claim, 1st, So constructing a wick tube that either round or flat wick can be employed, substantially in the manner as described.

2d, The construction and operation of a telescopic chimney, substantially as and for the purposes specified.

3d, Suspending the button to deflect the flame within the chimney, for the purposes fully described.

74,564.—QUARTZ CRUSHER.—S. T. McDougall, Brooklyn, N. Y.

I claim combining, constructing and operating the pounders and followers, substantially as shown for the purposes indicated.

74,565.—HORSE HAY FORK.—Edwin McKenzie, Watertown, N. Y.

I claim the locking device constructed as described, consisting of the bent lever, L, pivoted to the sleeve, C, and provided with the projection, h, fitting through the strip, B, into the sliding rod, A, and held in place by the spring, K, its upper end, i, slotted for the passage of the rod, A', and side strips, C, as herein shown and described.

74,566.—PAINT AND VARNISH BRUSH.—James McKittrick, Brooklyn, N. Y. Antedated Feb. 5, 1868.

I claim the tapering handle, A, of the paint brush, when made round at its lower end, and provided with two inclined pieces, B B, upon opposite sides, all constructed as described for the purpose specified.

74,567.—FANNING MILL.—Stewart McMillan, Fletcher, Ohio.

I claim, 1st, The inclined shoe, E, having the screens suspended from the cross frame, A, by means of the pivoted bars, h, and oscillated longitudinally from the crank, s, of the fan shatt, b, by means of the short pivoted bar, g, cross bar, e, and connecting rod, d, all constructed and described for the purpose specified.

2d, The construction and arrangement of the cross frame, A, hopper, C, oscillating pendent shoe, E, boxes, J J, drum, B, fan, D, pivoted lever, e, connecting rods, d, and crank, s, as herein described for the purpose specified.

74,568.—IMPLEMENT.—Ellis R. Meeker, Elizabeth, N. J.

I claim, 1st, The pendent extension, D, of the claw, C, of the hammer, in connection with the sliding jaw, H, all constructed and arranged substantially in the manner and for the purpose set forth.

2d, The detachable extension, E, with the guide rod, G, attached, and its upper end fitted in the pendent extension, D, in connection with the sliding jaw, H, and the screw, I, all arranged substantially in the manner and for the purpose specified.

74 569.—CORN SHELLER.—John A. Merriman, Chicago, Ill.

I claim, 1st, The shelling wheel, H, provided with one or more channels, d, having elastic or yielding bottoms, in combination with a shelling cone, K, arranged and operating substantially in the manner and for the purpose set forth.

2d, In combination with a corn shelling wheel and cone, an annular cob receiver, I, and cob conveyer, h, arranged and operating substantially in the manner and for the purposes described.

3d, In combination with the shelling devices and cob receiver, as above described, another corn receiver, L, and corn conveyer, i, arranged so as to operate substantially as specified.

4th, In combination with a shelling wheel, H, cob receiver, I, and corn receiver, L, the arrangement of the fan wings, j, operating as and for the purposes shown and set forth.

74,570.—PROCESS OF ROLLING HOES.—S. A. Millard, Clayville, N. Y.

I claim forming the head and blade portions of a hoe by rolling the stock out between rotary dies, in the manner substantially as described, that is to say, by rolling the stock alternately from near the center toward each edge, so as to "spread" the blank, and then alternately lengthwise in one direction, to form the ears, and lengthwise in the other direction to draw or plait out the blade toward its edge.

74,571.—HAY PRESS.—Moses R. Molleur, Chicago, Ill.

I claim the combination of the vertical box, A, provided with doors, B B, opening upward, the movable bottom, C, follower, D, cords, K, rollers, R, ratchets and pawls, H I, all arranged and operating as and for the purpose specified.

2d, In combination with a hay press having yielding sides, as described, the rod, M, and lever, P, arranged and operating substantially in the manner and for the purposes set forth.

74,572.—MACHINE FOR CORRUGATING SHEET METAL.—Geo. R. Moore, Lyons, Iowa.

I claim, 1st, The combination of the base plate, B, standard, A, arms, E and F, and arched braces, S constructed and arranged substantially as described.

2d, The combination of the extension arm, G, with the arm, F, and hinged supports, C and D, constructed and arranged substantially as described.

3d, The combination of arms, F and G, roller bearings, H H, and corrugating rollers, I and J, constructed and arranged substantially as described.

4th, The combination of the rods, M M, gage, L, latch nut, O, and screw arbor, P, constructed and arranged substantially as described.

74,573.—BOXES FOR STREET STOP COCKS.—Harvey A. Moore, E. Otis Frink and Samuel C. Frink, Indianapolis, Ind.

We claim a street stop cock box for gas, water, or other purposes, provided with the flanges, e and f, and the inclined flanges, h, substantially as and for the purpose specified.

Also, the cover, provided with the lugs, L and k, substantially as described and for the purposes set forth.

74,574.—COMBINED CANE MILL AND STEAM ENGINE.—John Moore, Madison, Ind.

I claim the arrangement of the cylinder of a steam engine and the rollers of a cane mill upon the same frame, substantially as herein shown and described for the purpose specified.

74,575.—BOLT CUTTER.—Thos. W. Moore, Richmond, Ind.

I claim the combination of lever, A, provided with cutting edge, as set forth, and lever, B, provided with aperture, b, when operating substantially as and for the purpose described.

74,576.—CARRIAGE JACK.—Adam Meyers, Van Wert, Ohio.

I claim the combination of the adjustable spring catch or shoulder, E, with the long arm, A, of the jack, substantially in the manner herein shown and described and for the purpose set forth.

74,577.—HARVESTER.—Wm. Neff, Centre Hall, Pa.

I claim the arrangement of the rocker lever, i, on the shaft, f, and its connection to the main frame by a link, j, and to the lever, D, by a flexible connection, k, so that operating the lever, D, will raise and lower the finger-bar at both ends simultaneously, substantially as described.

Also, in combination with a hinged drag bar, B, that can roll to and from the main frame, the gag bar, d, connected thereto by the curved pivot, e, as and for the purpose substantially as described.

Also, the reel arms, working in the same circuit, but at different velocities, and independent of each other at different portions thereof, when driven through eccentrically-hung circular gears, substantially as described.

74,578.—DEVICE FOR CHANGING FEED.—R. L. Nelson, Mexico, N. Y.

I claim, 1st, So arranging the gear wheels, a b, on two parallel shafts, B C, which are to be connected, for changing the feed of certain mechanism that the line drawn over the faces of the wheels on either shaft will be a curved line, as set forth.

2d, Hinging the swinging frame, E, in which the shifting gear, d, is held, so that the shifting gear will first come in gear with the driving shaft, and then with the shaft that is to be driven, as set forth.

3d, The sliding frame, D, in which the shaft, F, that carries the shifting gear d, has its bearings, when connected, by means of jointed bars, e, with the rock shaft, G, substantially as and for the purpose herein shown and described.

4th, The arrangement and combination of the shafts, B C, carrying the gear wheels, a a, respectively, with the wheel, d, on the shaft, F, sliding frame, D, hinged frame, E, levers, c c, bars, e e, and rock shaft, G, all made and operating substantially as herein shown and described.

74,579.—CARRIAGE WHEEL.—T. Nevison, Jr., and J. Nevison, Morgan, Ohio.

We claim the herein-described wheel, when the spokes of the same are constructed and secured to each other and the felly or rim, in the manner substantially as set forth.

74,580.—SLIDE-BLOCK LAST.—P. A. Newhall, Lynn, Mass.

I claim, in combination with a slide block, fitted by tongue and groove to slide upon the last, the square face or point, g, to abut against the shoulder, f, in the last, to be thereby protected from slipping back, substantially as set forth.

74,581.—WAGON-POLE SUPPORT.—Don Carlos Newton, Batavia, Ill.

I claim, 1st, The combination of the steel spring, B, with the wooden lever, C.

2d, The manner of attaching the wooden lever, C, to the draw bolt, E, by means of the chain, D.

74,582.—DEVICE TO PREVENT HOGS FROM ROOTING.—Geo. Nixon and Wm. L. Nixon, Sandyville, Ohio.

We claim the within-described device, consisting of the plate, A, arms, C C, with holes, D D, and wire, B, the several parts being arranged and used substantially in the manner and for the purpose herein specified.

74,583.—STEAM-ENGINE VALVE.—Wm. Ord, Brooklyn, Ohio.

I claim, 1st, The combination of the segments, A, having chambers, E, with the slotted stem, B, and heads, e, substantially as set forth.

2d, In combination with the above, the links, L, wedges, a, and key, D, substantially as specified.

3d, In combination with the above, the screw, H, and springs, S, substantially as described.

74,584.—SEWING MACHINE.—T. C. Page, Chicopee, Mass. Antedated Feb. 7, 1868.

I claim, 1s, A needle bar and needle, having a reciprocating rotary motion, in combination with a looping device, working beneath the bed plate of the machine, substantially as described.

2d, The combination of the spiral slot, b, and straight slot, l, formed in the needle bar, e, substantially as set forth.

74,585.—MULE FOR SPINNING.—John Paley and Thos. Rawsthorne, Preston, G. B. Patented in England, Nov. 23, 1864.

We claim the combination, with the driving band, b, of the fast and loose pulleys, d, of the cam shaft, the connected levers, e i, and the block, l, and weight, m, of lever, i, substantially as shown.

74,586.—MACHINE FOR CUTTING AND SEPARATING DYE WOODS.—G. W. Pearson, Billerica, and D. Coburn, Lowell, Mass.

We claim, 1st, The conducting spout, e', and aprons, a' a', or their equivalents, in combination with the cylinders, b b, for the purpose substantially as described.

2d, The application of the elevator and reel bolt, r, in combination with the conducting spout, e', and aprons, a' a', when arranged to operate substantially as described and for the purposes fully set forth.

3d, The combination and arrangement of the cylinders, b b, with the cutters, c c, conducting spout, e', aprons, a' a', reel bolt, r, cam, n, block, v, and elevator, all for the purposes herein described and fully set forth.

74,587.—COMPOSITION FOR MANUFACTURING STONE, AND FOR other purposes.—A. Pelletier, Washington, D. C.

I claim, 1st, The compound consisting of vegetable fiber, mineral asbestos, emery powder, soapstone, silicate of soda or (potassa), and litharge, substantially as described and set forth.

2d, The compound consisting of vegetable fiber, mineral asbestos, emery, soapstone, silicate of soda, or potash, litharge, when manufactured into stone (sand being used in addition), or when coated on wood, cloth, leather, brick, stone, metals, or other solid surfaces, and treated with chloride of zinc, oxide of zinc, sal-ammoniac, chloride and sulphate of iron, salts of lead, and manganese, sulphate of lime, substantially as described and for the purpose set forth.

3d, As a new article of manufacture, the composition, substantially as herein described and for the purposes set forth.

74,588.—HEAD BLOCK FOR SAW MILLS.—Benjamin P. Perry, Richmond, Ind.

I claim, 1st, Connecting the pawls, P and P', with the sleeve, a, on the same side of the latter, by which a simultaneous action of said pawls is produced, resulting in the alternate operation on the ratchet, substantially as set forth.

2d, The collet, H, having the projection, h, in combination with the eccentrics, n and n', for adjusting the feed, substantially as set for h.

74,589.—CARRIAGE STEP.—G. M. Plympton, New York city.

I claim a step for carriages, etc., formed of the two plates, F and A, in combination with the india-rubber ribs, D, or their equivalents, when the plate, A is formed to receive such ribs, D, substantially as and for the purpose described.

74,590.—BRICK AND MORTAR ELEVATOR.—Anthony Pohl, Detroit, Mich.

I claim the endless chain or belt carrying pivoted open frames, supporting the removable shouldered, boxes, f, for the purpose substantially as described.

74,591.—SHACKLE FOR PLATFORM SPRINGS OF WAGONS.—J. Price, New York city.

I claim a shackle for connecting the ends of the parts of platform springs, composed of the cross tubes, a b, and bolts, c c e e, all constructed and applied substantially in the manner as and for the purpose herein specified.

74,592.—OX YOKE.—Homer Rawson (assignor to himself and O. H. Shaw), Jericho, Vt.

I claim the adjustable hinge, C, on the cap, A, and the movable or adjustable staple, E, in the center of the yoke, B, all for the purpose as herein set forth.

74,593.—VALVE FOR STEAM ENGINE.—Joseph Reichmann, Dubuque, Iowa.

I claim, 1st, The steam and exhaust ports, so arranged as to cause the motion of the valve piston, or its equivalent, and to check and stop said motion of said piston, or its equivalent, substantially as herein set forth.

2d, The stationary valve-plate, h, constructed as described.

3d, The combination of the valve, d, piston, f, cylinder, c, plate, h, and valve, i, constructed as described, and so arranged as to produce self-acting and self-checking motion, substantially as and in the manner herein set forth.

74,594.—BREECH-LOADING FIRE-ARM.—S. S. Rembert, Memphis, Tenn.

I claim, 1st, The retractors, O, pivoted to the sides of the stock, and operated by the trigger guard, whereby, as the barrels are raised by pushing forward the trigger guard, the upper ends of the retractors catch against the nipple, K, and withdraw the cartridge, as herein shown and described.

2d, The nipple, K, when inserted in the cartridge case, J, with its lower end resting upon the screw block, N, in the under side of said cartridge, as herein shown and described.

74,595.—PEARL BARLEY MACHINE.—W. Rickard, Chicago, Ill.

I claim, 1st, The cylinder, C, constructed substantially as herein shown and described, in combination with the perforated casing, D, and seat, B, as and for the purpose set forth.

2d, Forming the long holes or slots in the casing, D, with their lips inclined to the right and to the left, substantially as herein shown and described, so that the machine may work equally well whether run backward or forward.

3d, In combination with the cylinder, C, case, D, and shaft, B, as constructed, the fan chamber, G, and fan, H, as set forth, for the purpose specified.

74,596.—HITCHING POST CAP.—Richard N. Roberts, New Britain, Conn.

I claim an improved article of manufacture, viz: a metallic hitching-post cap, in combination with a cam strap-holder, constructed and arranged substantially as described.

74,597.—STEAM GLOBE VALVE.—Louis C. Rodier, Springfield, Mass.

I claim the metallic plug having one or more valve seats therein, and one or more valves attached thereto, in combination with the shell or case, A, of a globe valve, the aperture, B, being constructed therein so as to receive said plug, and the whole arranged substantially as herein described and set forth.

74,598.—PLATE LIFTER.—G. O. Roe, Conantsville, Conn. Antedated Feb. 6, 1868.

I claim the lifter composed of the hooked arms, b, shank, a, and sliding hook, c, the whole arranged and operating substantially as and for the purpose specified.

74,599.—BOOTS AND SHOES.—Evan T. Rogers, San Francisco, Cal.

I claim making the ridges on the markers by casting them in one piece with the plate, substantially as described.

74,600.—HARVESTER.—Wm. Rose, Lake, Ill.

I claim the combination of the cam wheel, J K, arm, P, rod, Q, block, L, arm, M, and arc, N, all constructed, arranged, and operating in the manner and for the purposes specified.

74,601.—PLIERS FOR BENDING SHEET METAL.—Maier Rothschild, Harrisburgh, Pa.

I claim the form, construction, and arrangement of the jaws, A and B, and their combination with the handles and spring, as herein described and for the purpose set forth.

74,602.—SLEIGH BRAKE.—William D. Rowlstone, Butternuts, N. Y.

I claim the above-named sleigh brake, arranged substantially as above described and for the purposes herein mentioned.

74,603.—COTTON AND HAY PRESS.—Wm. Russell (assignor to himself and Geo. Winship), Atlanta, Ga.

I claim, 1st, When used in a cotton and hay press, the combination of the stationary vertical screw rods, R R, with the movable nut, V, having the trunnions, v v, and the arms, H H, for the purpose of moving the follow block up and down, while allowing it to be turned aside from the top of the press box, all the parts referred to operating substantially in the manner and for the purposes specified.

2d, The bent arms, H H, attached to the follow block, and provided with ears, h h, which are supported by and pivoted upon a nut or other device, working up and down by the action of screw rods, R R, substantially as and for the purpose set forth.

3d, The gear wheel, G, provided with the inner rim, o o, and fixed to the wooden beams, d d, substantially as and for the purpose set forth.

4th, The combination of the screw rods, R R, with a follow block fixed to pivoted arms, so as to turn back away from the top of the press box when elevated above it, substantially as described.

5th, The combination of the press box, A, with the gear wheels, G g, screw rods, R R, arms, H H, and follow block, B, all the parts being constructed and operating together substantially in the manner and for the purposes specified.

74,604.—PHOTOGRAPHIC REST.—Napoleon Sarony, N. Y. city.

I claim, 1st, The bead block, d, constructed in the manner specified, in combination with the stand or column, a, and rod, b, as and for the purposes set forth.

2d, The rest holder, g, or g', in combination with the head block, d, rod, b, column, a, and rest, k k, substantially as and for the purposes set forth.

3d, The extension cabinet front or panel, in combination with the table, p, substantially as specified.

4th, Two or more rests, supported from one column by means of the rest holder, g, substantially as set forth.

5th, The curved arm, n', and movable table, n, in combination with the column, a, and rod, b, as and for the purposes set forth.

6th, Attaching the column, a, removably to a base, a', that is permanently attached to the floor, in order that the rest may be a fixture when connected to such base, but removable to other bases, for the purposes set forth.

74,605.—MEASURING FAUCET.—Frank Saunders, Aberdeen, Miss.

I claim, 1st, The propeller, B, sliding rod, C, with its plug, D, and locking slide, I, in combination with a faucet, substantially as and for the purpose set forth.

2d, The combination of the lifter, G, locking slide, I, and screw, d, arranged to operate essentially as specified.

3d, The flexible, spiral, or twisted vanes, B B', arranged as described, in combination with the mechanism for operating the index or closing devices, substantially as specified.

74,606.—COMPOSITION FOR ROOFING.—Henry K. Schanck, Chicago, Ill. Antedated December 27, 1867.

I claim, 1st, A composition for roofing and other analagous uses, composed of coal tar, sulphur, plumbago, clay, and litharge, substantially as herein described.

2d, In combination with the above, the employment of the ingredient, india-rubber, substantially in the manner and for the purpose set forth.

74,607.—PROCESS OF PRESERVING DEAD BODIES.—Charles A. Seely, and Charles J. Eames, New York city.

We claim, 1st, The process for preserving dead bodies, substantially as described.

2d, The use of carbolic acid, and combinations of carbolic acid with other substances for the preservation and embalming of dead bodies.

74,608.—DISINFECTING COMPOUND.—Charles A. Seely, and Charles J. Eames, New York city.

We claim the disinfecting compound as above described.

74,609.—LATHE FOR TURNING IRON.—William Sellers, Philadelphia, Pa.

I claim, 1st, Attaching the fixed or live head to the shear or bed, by bolts passing through and straining upon the flanges on the cross girths in the bed as described.

2d, Forming a hole in the side of the lathe beds, for the purpose of operating the bolts or other holding-down apparatus for the live heads, substantially as described.

3d, Casting a web across the bottom of lathe beds, between the two girths, under the head, for the purpose of stiffening the bed, when a hole is made in the side, and to form a secure tool receptacle in the same, substantially as described.

4th, Supporting the back journal of the spindle in a solid conical bearing when this bearing is held in position by an oil box, substantially as described.

5th, Receiving the end thrust of the spindle upon collars placed inside of an oil box, at the rear of the back bearing, when this box is so arranged as to permit the spindle to pass through it, for the purpose specified.

6th, The block, N, substantially as described, and for the purpose specified.

7th, Placing the lead screw under cover, and in a bearing its whole length, substantially as described.

8th, Engaging or disengaging the saddle or slide rest with a feed screw, supported as described, by means of a segment of a nut moving horizontally, for the purpose specified.

9th, Operating the longitudinal and cross feed of the lathe by two clutches on the same shaft, in the manner substantially as and for the purpose specified.

10th, Engaging and disengaging both clutches by movements of the same handle in the same direction, substantially as described.

74,610.—SPITTOON FOR CARS.—J. H. Seymour, Hagerstown, Md.

I claim, 1st, The combination of the conical shell, B, with the spittoon, C, and the bottom, A A*, substantially as and for the purpose specified.

2d, The neck, a, made with its interior of conical form, and largest at its lower end, arranged at the bottom of the spittoon, C, and in relation with the valve b, substantially as and for the purpose specified.

74,611.—MANUFACTURE OF TIN-LINED LEAD PIPE.—William Anthony Shaw, New York city. Antedated February 6, 1868.

I claim, 1st, The combination of the mandrel, C, with the ram, A, said mandrel being rigidly connected to said ram in a deep cavity, as shown and described, so as to give said mandrel capacity to spring in said cavity, and to adjust itself in the center of the die.

2d, Connecting the mandrel to the ram by the interposition of a flexible link, substantially as described.

3d, In combination with the ram, A, the cup, B, for the purpose of facilitating the connection between the mandrel and the ram, substantially as described.

74,612.—MANUFACTURE OF TIN-LINED LEAD PIPE.—William Anthony Shaw, New York city. Antedated February 6, 1868.

I claim, 1st, The formation of a metallic pipe, by forcing two or more of the ductile metals together, in the form of tubes, over a mandrel or core, out of two or more cylinders, and through, on, or in two or more ties, substantially as described.

2d, The use of two or more cylinders, two or more rams, and two or more dies, or their equivalents, when combined with a mandrel or core, substantially as described, for the purpose of making laminated pipe, whether said pipe be made of metal or other material.

3d, The manufacture of a metallic pipe, consisting of three tubes of soft metal, such as a tube of lead pressed between two tubes of tin, by forming and forcing them together, through three dies, out of three cylinders, over one core or mandrel, in the manner described.

4th, In combination with a pipe press, a set of drawing or stretching rollers, for the purpose of drawing or stretching the pipe on the mandrel or core, as it issues from the press, substantially as described.

5th, The manufacture of a continuous metal pipe, whether of lead or of composition, from metal disposed in two or more retaining cylinders, by forcing it out of the same in the form of two or more tubes, over a mandrel or core, and in such proportion that the retaining cylinders shall not both or all be exhausted at the same time, so as to avoid the defect in the pipe resulting from the failure of the successive charges to thoroughly weld, as in the ordinary press, substantially as described.

74,613.—MANUFACTURE OF TIN-LINED LEAD PIPE.—William Anthony Shaw, New York city. Antedated February 6, 1868.

I claim, 1st, Making the charge of metal in three distinct parts as described, and uniting them either before or after they are put in the cylinder.

2d, Making the central ingot or charge of tin, in the form of a double frustrum of a cone, or its equivalent, for the purpose of securing a uniform thickness of tin in the lead tube or pipe.

3d, Making the intermediate lead or alloy ingot in the form of a frustrum of a cone, substantially as described.

4th, Making the cavities, D, in the upper end of the charge, substantially as described, for the purpose specified.

74,614.—METHOD OF MAKING TAPERING TUBES.—William Anthony Shaw, New York city.

I claim the manufacture of a pipe, funnel-shaped, along its interior diameter, and of equal diameter externally, by pressing the material of which the pipe is composed out of a retaining cylinder, through a die, over a taper mandrel, substantially as described.

74,615.—HAMMER.—Otis Shepard, Alton, Ill.

I claim a hammer, the head of which is made of two parts, A and C, connected by the handle, M, and spring, k, when the several parts are constructed and operate in relation to each other, substantially as shown and specified.

74,616.—DIE FOR MAKING SQUARE-HEADED BOLTS.—William Shields, Philadelphia, Pa.

I claim the combination of the jaws, with flanges, A A, and the plunger, B, constructed and arranged, and operating substantially as and for the purpose herein described.

74,617.—ANIMAL TRAP.—James A. Sinclair, Woodsfield, O.

I claim, 1st, The combination of the tramp wheel, J, shaft, L, cog wheel, M, and toothed bar, N, having a knife or spear, X, pivoted to its end, and spring, O, with each other, substantially as herein shown and described, and for the purpose set forth.

2d, The combination of the drop gate, K, bent lever, R, and spring, O, with each other, and with the tramp-wheel, S, substantially as herein shown and described, and for the purpose set forth.

3d, The combination of the trap door, S, lever, T, arm, U, and bar, N, with each other, substantially as herein shown and described, and for the purpose set forth.

4th, The combination of the arm, W, with the bar, N, substantially as herein shown and described, and for the purpose set forth.

5th, The combination of the arms, A', and guide plates, Z, with the bar, N, and frame of the trap, substantially as herein shown and described.

6th, The combination of the inclined guide, B', and spring, C', with the bar, N, and frame of the trap, substantially as herein shown and described, and for the purpose set forth.

74,618.—BEEHIVE.—W. Y. Singleton, Springfield, Ill.

I claim, 1st, The absorbent bottom, C, and lid or top, D, constructed and applied to the hive, substantially in the manner as and for the purpose set forth.

2d, The air chamber, B, with the air passage, E, attached, substantially as and for the purpose specified.

74,619.—MODE OF BELTING TOBACCO.—Reuben T. Sitterley, Callaway county, Mo.

I claim the construction and combination of the blades, as herein described.

74,620.—HORSESHOE.—George W. Skinner, Rockford, Ill.

I claim, 1st, Constructing a horseshoe with a bevelled projecting spur, a, at its front, and the toe calk with a corresponding recess, to receive the spur, a, and then securing the toe calk in place by means of the same, together with a screw, b, as shown and described.

2d, The detachable heel calks, fitted to a recess in the under side of the shoe, and held in place by means of the projection, E or E', and screw, a', as shown and described.

74,621.—LATHE REST.—H. K. Smith, Norwich, Conn.

I claim the nut, F, made in three parts, G H and I, arranged together with screws, L and E, for operation, substantially as and for the purpose described.

74,622.—MEDICAL COMPOUND.—Joseph Smith, Schodack Centre, N. Y.

I claim a medical compound, comprising the ingredients about in the proportions herein set forth.

74,623.—HARNESS.—John J. Smokey, Natchez, Miss.

I claim the driving reins, A, when arranged and combined with a harness, substantially as and for the purpose described.

74,624.—CALCULATING SCALE BEAM.—George A. Smythe, Reading, Pa.

I claim the arrangement and combination of the slide, B, clasping around the whole beam, marked and notched as represented in fig. 1 and fig. 2, together with the shape of the slide, and the ounce line, marked sixteen on slide, showing the fractional parts of a pound and an ounce on the beam, and the amount in money.

74,625.—BEER FAUCET.—J. Michael Stark, Buffalo, N. Y.

I claim the combined cylinder and valve, B C, provided with the feeding and discharging holes, R Q, the plunger, F G, and ring, K, all constructed and arranged to operate within the body of the faucet, substantially as described.

74,626.—HARROW.—C. E. Steller, Chicago, Ill.

I claim, 1st, The combination of supports, J, and teeth, H, substantially as and for the purpose herein specified.

2d, The combination of teeth, H, collars, K, and caps, I, substantially as and for the purpose set forth.

3d, The round teeth, H, arranged to operate in enlarged holes, L, substantially as described.

4th, The rod, C, secured by staples, P P, in combination with joint, D, arranged substantially as and for the purpose set forth.

5th, The rods, E E, in combination with rod, C, and joint, D, arranged to operate as and for the purpose described.

74,627.—BEEHIVE.—H. A. Stidger, Carrollton, Ohio.

I claim, 1st, The combination of the ventilating openings, A E, with the sliding bottom board, F, and hinged cover, h, substantially as and for the purposes set forth.

2d, The movable glass frame, D, in combination with the doors, b b, and sliding bottom board, G, substantially as and for the purposes set forth.

3d, The strip of cloth, g2, on the under side of the lower end of the bottom board, G, in combination with the foot, g1, of the beehive, substantially as and for the purposes set forth.

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74,628.—BUREAU BEDSTEAD.—Mirum Sulzbacher, New York city.

I claim a bureau bedstead containing three extension pieces, a b c, with grooves, dowels, and transverse slats, a' b' c', said extension pieces, when pushed in, being enclosed in a case, A, with folding and sliding doors, f, all as shown and described.

74,629.—DENTAL INSTRUMENT.—S. C. Taylor, Toledo, Ohio.

I claim, 1st, In combination with the mallet and the trip motion, a permanent and a hinged lever, so that the user may hold the instrument and operate the mallet at the same time, and by one and the same hand, substantially as described.

2d, In combination with a pivoted lever and toe piece, or "crotchet," a rod and hook for catching, drawing down and releasing said toe piece, substantially as described.

3d, In combination with the mallet and a spring, in a plugging instrument, the sliding dog, or catch, and the teeth, for the purpose of compressing, graduating, or regulating the action of the spring upon the mallet without changing the extent of the motion of the lever, E, substantially as described.

74,630.—WATER HEATER FOR BATH TUBS, ETC.—William H. Thomas, Sacremento, Cal.

I claim a steam coil heating furnace, submerged in water, and supplied with air from the top, and provided with a tank, E, and deflector, h, all constructed and arranged substantially as herein shown and described.

74,631.—CAR COUPLING.—Stillman Thorpe and Wesley Thorpe, Turner, Me.

We claim the combination and arrangement of the sliding back, d, slotted arm, y, and pin, x, with the coupling pin, k, in connection with the weighted bolt, g, and the link, m, as and for the purposes set forth.

74,632.—WINDMILL.—Isaac P. Tice, New York city.

I claim the combination with the many cranked driving shaft, G, or other suitable driving mechanism, of the reciprocating wind boards, A B C, differently pitched or set for successive action in like directions, intermediately to each other, and controlled by valves or shutters, d, substantially as specified.

74,633.—MILK RACK.—Isaac P. Tice, New York city.

I claim the arrangement of the collars or bearings, b, and collars, b', on the stationary shaft, B, with relation to and in combination with the revolving shelves or stands, C, substantially as shown and described for the purpose specified.

74,634.—MACHINE FOR BUNDLING KINDLING WOOD.—Leonard Tilton, Brooklyn, N. Y.

I claim, 1st, The feed wheel or rim, C, placed between the plate, A, and rim, B, constructed and arranged to operate in the manner substantially as and for the purpose set forth.

2d, The bundling tube and plunger, I, arranged in relation with the wood receptacle to operate substantially in the manner as and for the purpose specified.

3d, The clearer, L, arranged in relation with the bundling tube, J, and operated from the cross heads, F' F'', in the manner substantially as and for the purposes set forth.

4th, The combination of the cam, Q, levers, R T', slide, S, with pawl, T, attached, and the counterpoise, U, all constructed and arranged to operate the feed wheel, substantially as set forth.

5th, The three cross heads, F F' F'', arranged in connection with the hooks K K, and pins e', to operate and give the proper or desired movements to the bundling tube, plunger and clearer, substantially as shown and described.

74,635.—PEAT MACHINE.—Josiah Tisdale, South Dedham, Mass.

I claim the arrangement, as well as the combination of the curved blades or shares with the screw propeller and its box, the whole being to operate together, substantially as hereinbefore explained.

74,636.—FRAME FOR SUPPORTING AND MOVING CLOTH TO BE CREASED.—A. W. Todd, Chicago, Ill.

I claim the combination and arrangement of crank, O, ratchet wheel, P, pawl, R, end pieces, B B, bar, D, rollers, C and A, points, h h, and feather edge, g, for supporting and moving the material to be creased, as described.

74,637.—BOOT BLACKING APPARATUS.—John Vandecar, Brooklyn, N. Y., assignor to Thaddeus B. Beecher, New Haven, Conn.

I claim connecting the foot rest of a boot blacking apparatus or device to its standard legs or supports, by a ball socket joint, substantially as herein specified.

74,638.—PUMP.—Jas. Vaughn and John McGee, Galena, Ill.

We claim the arrangement of the movable cylinders A, pivoted at B, in the yokes D, at each end of the horizontal rocking beam C, and fitting over the pistons, G, immovably fixed in the framing at each end of the cylinders, all constructed as described, whereby the cylinders are operated by the rocking beam, C, and kept in vertical line upon said pistons by the pins, B, in the yoke, D, as herein set forth for the purpose specified.

74,639.—TILL ALARM AND LOCK.—James J. Wagenhorst (assignor to himself, C. H. Zink and W. R. Weand), Philadelphia, Pa.

I claim, 1st, The combination of the tumblers, D, and their projections, e, with levers, E, on each of which are cams, f and f', all substantially as specified.

2d, The spring slide, L, its striker, p, and adjustable block, q, in combination with the lug, t, the sliding frame, G, its projection, s, and the recess, r, in the case, A, all substantially as and for the purpose specified.

3d, The spring slide, L, and its striker, p, in combination with an alarm bell, M.

74,640.—WASHING MACHINE.—C. E. Wahlgren, Knoxville, Ill.

I claim, 1st, The reservoir, B, in combination with the fluted ribs or rollers, F, of a washing board or machine, substantially as herein described.

2d, The wheels, H A, or their equivalent, in combination with the reservoir, B, and fluted ribs or rollers, F, substantially as herein described.

74,641.—COMPUTING APPARATUS.—Thomas Walworth, Newton Heath, Great Britain. Antedated Feb. 14, 1868.

I claim a plate, b, with an opening, c, and with graduations at its edges and at the edges of the opening, in combination with a graduated revolving disk, having figures arranged in radial rows, and with a pointer secured to and turning with the disk, the whole being constructed, arranged and operating substantially as described.

74,642.—WAGON BRAKE.—Joseph Walton, Delevan, Wis.

I claim, 1st, The brake, m, hung to box, A, by hooks, V, in combination with reach, B, substantially as set forth.

2d, The combination of guides, S S, plate, H, pin, I, spring, J, and rollers, substantially as described.

74,643.—CORN SHELLER.—Joseph Warren, Lodi, Ohio.

I claim the hopper, D, as constructed with octagonal sides, D', spring, E, in combination with the case, A, for the purpose set forth.

74,644.—SILK CLEANER.—Wm. G. Watson, Paterson, N. J.

I claim, 1st, The horizontal frame, A, provided with a curved guide, A, post D, flange b, and stand a, all constructed and arranged substantially as and for the purpose set forth.

2d, In combination with the above the fixed knife, B, and adjustable knife, C, when said knives, B and C, are horizontally arranged and reversibles, substantially as and for the purpose set forth.

3d, In combination with the frame, A, and knife, C, the adjusting screws, d d, substantially as set forth.

4th, The silk cleaner constructed substantially as described, and consisting of the frame having curved guides A, post D, stand a, and flange b, fixed knife B, adjustable knife C, and screws d d, all arranged as set forth.

74,645.—INNER SOLE.—R. A. Webster, Sandisfield, Mass.

I claim as a new article of manufacture, an inner sole composed of two strips of wood, A C, secured together by means of the gutta percha strip, B, heated and placed between them, as herein shown and described for the purpose specified.

74,646.—GANG PUNCH.—Benj. G. Welch, Danville, Pa.

I claim the construction and arrangement of the dies, c' c', or a gang punch, disconnected or separated from each other by suitable spaces, e' e'', in their bed plate, C D, substantially as described and set forth, for the purpose specified.

74,647.—CULINARY BOILER.—Isaac H. West and Tertius L. Camp, Evans, N. Y.

We claim the employment, in a closed steaming chamber, of an air passage near the bottom of said chamber, for admitting air beneath the body of steam, and a slide or register for gaging the flow of air, the whole arranged as described, and operating in the manner and for the purpose set forth.

Also, in combination with the central steaming chamber, A, arranged as above described, the enclosed end receptacles, B B, operating in the manner and for the purpose herein set forth.

74,648.—OIL BURNING APPARATUS.—A. J. White, Ballston Spa, N. Y.

I claim the combination of a wick tube, a, and pipe, b, with a movable reservoir, c, attached to a hollow stem cock, the whole arranged so as to operate substantially as set forth.

74,649.—CARRIAGE CURTAIN FASTENER.—E. P. Whitney, Stamford, Conn.

I claim a fastener for the aprons and curtains of carriages, composed of the parts, A and B, the former provided with the eyes, c c', and the latter with the head, d, and the offset, e, and both provided with loops, a, and otherwise constructed and operated, substantially as herein specified.

74,650.—GRAIN TRESHER.—A. S. Whittemore, Willimantic, Conn.

I claim, 1st, The longitudinal wires, a, forming the bottom of a frame of a threshing machine, when said wires are attached at each end to screws, a', whereby the tension of the wires may be regulated, substantially as described.

2d, In combination with the above, the shaft, B, bearing arms, e, and pivoted flails, e', the pulley, C, belt, e, and drive wheels, D d', all constructed, arranged and operating as set forth.

3d, The threshing machine, constructed as described, and consisting of a frame, A, having wire bottom, a, screws, a', shaft, B, arms, e, flails, e', pulley, C, drive wheels, D d', and belt, d, all arranged and operating as described.

74,651.—COMBINED SEED SOWER AND FIELD HARROW.—Daniel Wilber, Collins Centre, N. Y.

I claim, 1st, The slide, C, having notches or cavities, c1, c2, for the purpose and substantially as described.

2d, The combination with the slide, C, of the shaft, D, crank, d1, pitman, d2, bevel gearing, E F, and field roller, A, all arranged and operating in the manner and for the purpose substantially as set forth.

3d, The combination of the bevel pinion, F, placed loose upon the shaft, D, the feather, f', and pin, g, or its equivalent, all arranged and operating substantially as and for the purpose described.

74,652.—CORNSTALK CUTTERS PREPARATORY TO PLOWING.—John Wilde, Daniel Wilde and John H. Wilde, Washington, Iowa.

We claim, 1st, The arrangement of the main frame with the cutter cylinder and tongue and the wheel frame, as herein recited.

2d, Combining with the main frame and the wheel frame the treadle frame as and for the purpose herein set forth.

74,653.—DITCHING MACHINE.—I. M. Williams, Blanchester, Ohio.

I claim, 1st, The provision in a ditching machine of the endless band, H h, and drum, I, operating substantially as herein described, for emptying the elevating wheel of the excavated earth.

2d, Constructing the dirt elevating wheel of a ditching machine in two sections, D D', and providing them with radial spades, G, whose bases, g, are dovetailed into the rims, E E', of the wheel, and the whole secured together by bolts, e, substantially as herein described.

3d, The screw, N n, winch, O, nut, o, stirrups, P p p', and yokes, R R', arranged and operating as and for the purpose specified.

4th, In combination with the elevating wheel, D D', constructed as described, the fixed and parallel cutters, C C', as and for the purpose specified.

5th, In combination with the elevating wheel, D D', endless band, H h, and drum, I, the shovel, S, for the object set forth.

6th, In combination with the elevating wheel, D D', endless band, H h, and drum, I, the slotted standard, J J', groove, j, box, i, and wedge, K, arranged and operating substantially as and for the object explained.

7th, In combination with the frame, A, and vibratory platform, B, the perforated clevis, Y, pin, c, and plate, A', for the object stated.

74,654.—APPARATUS FOR VIGNETING PHOTOGRAPHIC NEGATIVES.—F. Wolf, Philadelphia, Pa. Antedated Feb. 5, 1868.

I claim the screen, C, provided with a suitable hole, the edge of which is made of a suitable transparent or semi-transparent material, in combination with supporting arms, D, and with a photographic camera, A, substantially as and for the purpose set forth.

74,655.—VENTILATORS.—H. B. Worth, Chicago, Ill., assignor to himself, Wm. H. Chapin and A. L. Creamer.

I claim, 1st, The combination of the inverted cone, J, with the shaft, B, and revolving fan cap, G, substantially as shown and described and for the purpose set forth.

2d, In combination with the above, the propelling fans I, mounted on rods H, attached to the revolving fan cap G, and hub g2, on shaft B, substantially as and for the purpose set forth.

74,656.—SAFETY VALVES.—Jearum Atkins, Mokena, Ill.

I claim, 1st, The construction of the safety valve lever C, or its equivalent, with its outer portion curved, and its combination with the mortised spindle B, roller f, and spring catch h, substantially as specified.

2d, In combination with a spring balance D, the rocking bar k, screw i, and nut m, as described and set forth.

3d, The arrangement of the lever C, bent to form an angle with the link S, standard P, and pins n, t and u, substantially as described.

4th, The combination of the rolling fulcrum f, with the safety valve lever C, substantially as shown and described.

74,657.—HAND STAMP.—Joseph H. Berret, New York city.

I claim a stamp and cancelling device, constructed as described, consisting of the vertical arbor F, bearing the cutters G, working through the tubular arbor B, and annular stamp C, whereby the knob H, and its collar upon the arbor F, operate the arbor B and C, as herein shown and described.

71,658.—ANIMAL TRAP.—Wm. J. Biddle and Henry L. Biddle, New Madison, Ohio.

We claim the combination of the tilting platform D, with the pivoted bar g, arranged for holding the bait and latch e, fastened to the same, substantially as described and for the purpose set forth.

74,659.—BOILER FEEDER.—Edwin Brockway, Haverstraw, N. Y.

I claim, 1st, The arrangement of the connecting devices, a, b and E, as shown and described.

2d, The guard K, as shown and described, on pipe H, to keep scum from entering the steam pipe.

74,660.—BED BOTTOM.—J. W. Brown, Hudson, Wis.

I claim the construction of boxes B, of notched bars, a a, and a removable cover, b, in combination with separate removable pins, c, elastic suspension loops, g, and slats, C, all arranged substantially as described.

74,661.—CURTAIN FIXTURE.—Wm. Brown, West Cambridge, Mass. Antedated Feb. 6, 1868.

I claim, 1st, The split roller, a, with or without a tongue and groove, for securing the upper end of the shade, substantially as described, in combination with the case or shell, D, as and for the purpose specified.

2d, The combination of the split roller, a, the nuts or disks, c c', and the brackets, B B', arranged and operating substantially as described.

3d, The combination of the split roller, a, the shell, D, and the cornice, E, constructed, arranged, and operating substantially as described.

74,662.—ROTARY STEAM ENGINE.—H. T. Buff, Franklin, Ind.

I claim, 1st, The self-adjusting valves, V and V', with their grooves, arranged substantially as herein set forth.

2d, The arrangements of the rotary head, valves, and springs, as herein set fortb.

3d, The arrangement of the steam and escape pipes, as herein described.

74,663.—SIRUP PITCHER.—Henry Bullard, Middletown, Conn.

I claim the arrangement of the slide or cut off, a, upon the spout, B, independent of the cover, and in combination with a lever and spring, as a means of operating the said slide, substantially as herein set forth.

74,664.—FLY NET.—C. K. Burkholder, York Springs, Pa.

I claim the ribs, constructed and perforated as shown, and laced, in the manner and for the purpose set forth.

74,665.—STAGING.—C. S. Burton, Seneca County, Ohio.

I claim the combination of the grooved standards, A A, platform, K, and bench, M, windlass and cords, H H, all constructed and operating as specified.

74,666.—DEVICE FOR TURNING DOWN AND BURYING STALKS, WEEDS, ETC.—Stephen Collins, Prescott, Wis.

I claim the arms, C C' C'' and E, and brace, D, attached to the plow beam substantially as and for the purpose set forth.

74,667.—WATER WHEEL.—B. D. Compton, Dowagiac, Mich.

I claim, 1st, The disk, A, having a series of triangular or V-shaped hinged buckets, D, and secured to a disk, C, around a vertical shaft, B, by the braces d d, in the manner substantially as and for the purposes specified.

2d, In combination with the hinged buckets, D, and disk, A, beveled as described, the latch, f, constructed as specified, and used as and for the purposes set forth.

74,668.—WOOD BENDING MACHINE.—James Conner, Richmond, Ind.

I claim, 1st, The former, D, when provided with stirrup, S, and operating substantially as set forth and for the purpose described.

2d, The pivoted head block, G, arranged and operating substantially as set forth and for the purpose specified.

74,669.—HOSPITAL BED.—Hannah Conway, Dayton, Ohio.

I claim the combination of the fixed canvas frame, B, and bed, E, operated by the axle, G, underneath frame, B, and the movable pillow C, with the axle G', and the permanent frame under the bed, E, all as herein set forth.

74,670.—LAMP.—E. E. Dailey, Wm. H. Johnson, and C. C. Du Bois, Brooklyn, E. D., N. Y.

We claim the cooling chamber, a, air supply chamber, b, formed by the perforated flange, e, ring, g, transparent cylinder, h, and locking cap, i, all arranged, constructed, and combined as described.

74,671.—INKSTAND.—Otis Dean (assignor to Robt. W. Young), Richmond, Va.

I claim the rigid arm, D', attached to a dipper, C, which is connected to the lid by a rod, D, so as to operate in the manner and for the purpose set forth.

74,672.—SPRING FOR HOOPED SKIRT.—Thos. B. De Forest and Thos. S. Gilbert, Birmingham, Conn.

We claim a skirt loop formed by inclosing one or more wires within a covering which not only envelops and protects the wire, but forms and edge, A, or connection, B, substantially as and for the purpose specified.

74,673.—HARROW.—Daniel L. Dickson, Durham, Ill.

I claim the combination of the frame, with cylinder, J, with teeth, a a, and clearer, K, in front of said cylinder, the whole arranged and operating as specified.

74,674.—BLACKING BRUSH.—J. H. Doughty, New York city.

I claim, 1st, The double hold-fasts or handles a b, provided with a platform e, which is held horizontally away from the handle, b, by a prolongation of the same, arranged substantially as described.

2d, The arrangement of the damper, f, and scraper, h, on the platform, e, by means of the bolt, i, and nut, j, substantially as and for the purposes described.

74,675.—SPRING BED BOTTOM.—Wm. I. Emens, Louisville, Ky.

I claim the combination of the forked hook, E, and the slat, F, the gum ring, D, the movable cross piece, A, and the parallel strips, B and C, when constructed, arranged, and operating in the manner set forth.

74,676.—HARVESTER.—George Esterly, Whitewater, Wis.

I claim, 1st, The combination of long fingers or teeth, d, which are not jointed, with a cutting apparatus consisting of a rolling finger beam, short fingers, and a sickle, and which is adjustable bodily, so as to raise and lower the bight or cut, and also adjustable in such a manner that the front ends of both sets of fingers can have their angle of presentation to the grain changed and fixed to work at a given hight, all substantially as described.

2d, The application to a hinged platform, E, of a dropper, F, which latter is supported at its rear end so that it can be tilted backward at pleasure, substantially as described.

3d, Connecting the beam, to the main draft frame, A, by means of flexible or hinged arms, m, or their equivalent, in combination with the draft chain, r, and forward truck, K, substantially as and for the purposes described.

4th, The combination of a hinged, slatted dropper, F, with a platform, E, whether the latter be hinged or fixed rigidly to the finger bar, such dropper being arranged substantially as described.

5th, The combination of the devices, f f', or their equivalents, for adjusting the grain end of the finger beam in the path of a vertical circle, with the device, d2, or its equivalent, for adjusting in like manner the inner or heel end of the finger beam, substantially as described.

6th, The arrangement of the belt tightener upon the hinged beam, J, said tightener and said beam operating together substantially as described.

74,677.—SHAFT AND POLE COUPLING.—Perry Finley, Memphis, Tenn.

I claim the coupling, E, with the groove, L, and staples, G G G, the square thimble, F, the slide, D, with the mortise, H, the strap, I, and buckle, M, the fixed bolt, arranged substantially for the purpose herein set forth.

74,678.—CULTIVATOR.—John Frank, Webster City, Iowa.

I claim, 1st, The adjustable blocks, C, constructed and operating substantially as described.

2d, The cultivator as it stands, with its various parts and devices, combined, arranged, and operating substantially as and for the purposes herein specified.

74,679.—PLOW MOLD BOARD.—Richard Gaines and Melchi Scott, Fairfield, Iowa.

We claim, 1st, The metallic plow mold board, A, provided with V-shaped groove along the edges, and studs or buttons, B B, on its concave surface, in combination with glass cast over said surface in its molten state, substantially as herein set forth and specified.

2d, The protuberances or knobs, C C, arranged as described, for the purpose of securing the mold board to the plow, substantially as set forth, in combination with the above described mold board.

74,680.—MEDICAL COMPOUND.—G. W. C. Gamble, Millersburg, Iowa.

I claim a cure for cancer composed of the ingredients set forth, when prepared in the manner substantially as described.

74,681.—APPARATUS FOR HANGING ANIMALS IN SLAUGHTERING.—Almeron Graves, Roscoe, Ill.

I claim the application of the lever, C D E, the upright, B, the revolving apparatus represented by H H H H H H, supports, I I I I I, and the revolving cans, E E, in apparatus for handling animals in slaughtering.

74,682.—BAIT AND VEGETABLE CUTTER.—Zebulon G. Greenleaf, Bath, Me.

I claim the combination of the cutting blades provided with screw shanks, with the hollow cylindrical case, B, and central shaft, D, arranged as and for the purposes herein described.

74,683.—EXERCISING APPARATUS.—Geo. W. S. Hall, Baltimore, Md.

I claim the combined arrangement of the horizontal bar, E, adjustable suspension rope, F, and spring, H, as and for the purposes set forth.

74,684.—RAZOR STROP.—J. P. Hall, Wallingford, Conn.

I claim the arrangement of the drawer, B, within the case, A, when the said case, A, is constructed for the reception of the strop, C, in a case within the principal case, A, substantially as herein set forth, as a new article of manufacture.

74,685.—HARVESTER.—B. G. H. Hathaway, Rock Stream, N. Y.

I claim, 1st, The arrangement of the sliding clutch G, yoke, G1, lever, G2, bell crank, G3, stem, G4, spring, G5, and spherical case, D, substantially as described.

2d, The combination a shoe so attached as to oscillate laterally, and a finger bar so hinged thereto that the shoe remaining stationary, the finger bar may be folded back in a horizontal plane, to stand parallel with the line of draft, substantially as described.

3d, The combination of the shoe, O, hinged finger bar, N, spring, P, or its equivalent, and lever, Q, substantially as set forth.

74,686.—EXTENSION COAL CHUTE.—Jacob Heatherington, Bellair, Ohio.

I claim the combination of the extension plank or rod, H, chute, G, rollers, h h r r, and extension beam, J, the whole constructed and operating substantially as and for the purpose specified.

74,687.—WIND WHEEL.—John Hidden, Lawrence, Kansas.

I claim the combination of the adjustable deflector, I, with the vane, F, drum, E, wings and spindles, D and a, wheels, G G', and chains, c and d, substantially as described.

74,688.—SCHOOL DESK.—Geo. W. Hildreth, Lockport, N. Y.

I claim the joint, o, in combination with the ordinary joint, s, for the purpose of raising the central portion of the desk lid, to form a book rack of the desk top or lid, as herein specified and shown.

74,689.—CARRIAGE.—Edgar Hitt, Katonah, N. Y.

I claim, 1st, The clamp, C, provided with a socket, a, in combination with the spring bar, A, and body loop, substantially as and for the purpose set forth.

2d, The square head, d, at the end of the body loop, to fit into a corresponding socket in the clamp, C, substantially as and for the purpose described.

3d, The projections or lips, c, on the inner surfaces of the clamp, to fit into notches, d, on the the spring bar, A, substantially as and for the purpose set forth.

74,690.—FENCE FOR COLLECTING RAIN WATER FOR STOCK.—Luther Howe, Alamo, Mich.

I claim the rain collecting boards, A, and rain gutters, B, in connection and combination with a farm fence, for collecting and conveying rain water to artificial or natural reservoir, substantially as and for the purpose herein specified.

74,691.—HARNESS PAD.—John Hughes, Newark, N. J.

I claim, 1st, In combination with the iron frame, A, the socket for the nut, H, the strips, B B, and flexible piece, F, constructed as herein described and for the purpose set forth.

2d, The braces, K K, or their equivalents, for the purpose specified.

3d, The binding, N, stitched to the bottom, C, before it is put to the frame, A, and the form, P, in the binding, and the mode of securing the bottom and form to the frame.

4th, The frame, A, with the slots, E E, and grooves for the strips, B B, and holes, V V, in the manner and for the purposes specified.

74,692.—PICTURE KNOB.—E. D. Ives, New Haven, Conn.

I claim, 1st, Forming and attaching knobs of glass or similar materal to screws or nails, substantially in the manner herein set forth.

2d, The combination of the threaded nail, B, and socket, C, when the said socket has formed thereon a knob or head of glass or similar material, and when the said glass or similar material is formed and attached thereon in the process herein set forth.

74,693.—MACHINE FOR CUTTING GLAZIERS' POINTS.—James M. Jay, Canton, Ohio.

I claim, 1st, The arrangement and combination of the rotary cutters, M N M N, on the shafts, D and H, when operating in connection with each other through the gear wheels, F, G, for the purpose of cutting glaziers' points, or any brads or nails which may be cut from sheet metal, substantially in the manner herein specified.

2d, The arrangement and combination of the cam, I, feed lever, U, with pawl, V, ratchet wheel, T, catch, c, and feed rollers, P Q, when used in combination with the rotary cutters, M N M N, substantially in the manner and for the purpose herein specified.

74,694.—SEWING MACHINE.—Geo. L. Jencks, Florence, Mass., assignor to the Florence Sewing Machine Company.

I claim, 1st, The manner of combining and arranging both the interlacing hook and shuttle, constructed as described, upon the concave side of the curved needle, so that the loop of the needle thread will be presented to the hook and shuttle from the curved side of the needle, and carried thence directly to the rear of the needle, and around the shuttle, substantially as shown and described.

2d, So combining and arranging the said hook and shuttle, and the eye-pointed needle, as described, with the independent mechanism set forth for taking up the loop of the needle thread after it has been carried around the shuttle, as described, that the said loop may be taken up and the stitch completed at one and the same cycle of operation of the machine, substantially as described.

3d, The take-up mechanism, substantially as described, in combination with the sewing mechanism, constructed and operating substantially as set forth.

4th, The circular shuttle, constructed substantially as described, with a beveled edge, and in combination therewith a delivery notch and a spring presser, arranged substantially as described, for the purpose of producing the requisite tension of the shuttle thread as it is delivered, substantially as described.

5th, Mounting or holding the shuttle upon a stationary pedestal or its equivalent, as described, and controling the operation of the shuttle by means of a tilting bar or finger, or its equivalent, arranged to operate therewith, substantially as and for the purpose specified.

6th, The interlacing hook, in combination with the beveled-edged shuttle, constructed and operating as described, to catch and carry the loop of needle thread around said shuttle, substantially in the manner described.

7th, So combining the recess, c, in which the needle vibrates, and the bridge ring, and the interlacing hook, and shuttle, constructed and arranged substantially as described, that the lower thread of the loop will be caught by the hook and carried in a direct line beneath the shuttle, while the upper thread of said loop is carried against the beveled shuttle edge, and over the shuttle, substantially in the manner and for the purpose specified.

8th, The construction and mode of hanging and adjusting the needle-arm and the presser-arm, by means of the screw stud and screw sleeve, in combination, substantially as described.

9th, The mode of securing the needle, n, at the end of the needle-arm, by means of the screw bolt and washer, constructed substantially as described.

74,695.—TRAIN FOR LAMPS.—Geo. A. Jones, New York city.

I claim, 1st, In a train or mechanism designed for use in lamps, the application and use of the open or lantern pinion and its arbor, constructed substantially as and for the purposes set forth.

2d, In such mechanism the combination of a single thread, flat top, solid cut screw, with a square-toothed wheel, arranged and operating substantially as described.

3d, The air tube, constructed from a single piece of metal, substantially as and for the purposes set forth.

4th, In combination with the endless screw, d, attaching its lower support or bridge, c', to the side plate of the mechanism, substantially as and for the purposes set forth.

5th, The construction of the jewel plates, having a concave conical jewe seat, and confined to the supporting plates by a single screw, substantially as and for the purposes set forth.

6th, A mechanical movement for lamps, its several parts constructed and arranged and operating substantially as described.

74,696.—PLATFORM SCALE.—Joel F. Keeler, Pittsburg, Pa.

I claim constructing long platform scales with a series of diagonal main or platform levers, when such levers are connected with a series of four or more secondary levers, which secondary levers rest nearly or quite on the same horizontal plane with each other, substantially in the manner and for the purposes described.

74,697.—PIPE TONGS.—Wm. Kenyon, Jr., Steubenville, Ohio, assignor to himself and Henry K. Kenyon.

I claim the combination of the bifurcated movable jaw, d, with the eccentric cam head, a, at the end of the handle of a pipe wrench, constructed and arranged substantially as hereinbefore described.

74,698.—FILTERING BURNING FLUID.—John D. Kirkpatrick, Urbana, Ohio.

I claim, 1st, Filtering burning fluids consecutively through separate layers of lime and wood ashes, elm bark, charcoal, and sand, each ingredient being placed on flannel, in the bottom of the filtering vessels, substantially as and for the purposes set forth.

2d, The filtering apparatus, consisting of the bottom, A, frame, B, vessels, a b c d, with perforated bottoms, a' b' c' d', and false bottom, F, and reservoir, G, provided with stop-cock, E, substantially as and for the purposes described.

74,699.—POTATO DIGGER.—Gottlieb Koenig and Geo. Otto, Plymouth, Mich.

We claim the combination of the traction wheels, A A, the gear wheels, B B, the pinions, C C, the shaft, D, the crank axle, E, the revolving teeth, F F F F F, the rack, G, the arms, H H, the roller, I, the seat, J, the lever, K, the catch, L, the spring, M, with a suitable frame, when arranged substantially as and for the purpose described.

74,700.—PUNCHING APPARATUS.—Isaac Lamplugh, Peoria, Ill.

I claim the improved punching apparatus, consisting of the several devices constructed, combined, and arranged in the manner and for the purposes herein set forth.

74,701.—MACHINE FOR GRINDING CUTTERS OF MOWING MACHINES, ETC.—Wm. H. Laubach, Philadelphia, Pa., assignor to himself and Geo. H. Mellen, Alexandria, Va.

I claim, 1st, The adjustable bed piece, B, constructed as described, and applied to a grinding machine as and for the purpose specified.

2d, The bed piece, B, provided with slot, m, and screw, m', in combination with the clamp, r, and screws, r' r', as and for the purpose set forth.

3d, The post, d, provided with the slot, k', and arm, d2, in combination

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with the set screws, k and c, and the rotating shaft, b, substantially as described.

4th, The grindstone, i, in combination with the rotating and sliding shaft, b, as and for the purpose described.

5th, The adjustable bed piece, B, in combination with the clamp, r, post, d, grindstone, i, and rotating and sliding shaft, b, as and for the purpose specified.

74,702.—BUNG.—James B. Lefferson, New York city.

I claim the shaft, B, provided with cog teeth, e e, in combination with the knives, o D, provided with recesses, as described, said knives being arranged to operate between the bung, A, and case, a', as and for the purposes specified.

74,703.—HAY AND COTTON PRESS.—C. Lent, Washington, D. C.

I claim the arrangement of the press box, as constructed with the shaft, G, provided with follow block H, and cross head, J, nut, E, cross tie, D, plate, a, and guide pieces, I I, the several parts being connected and used substantially as and for the purpose set forth.

74,704.—COMBINED CLOCK AND ADVERTISER.—G. M. Levette, Indianapolis, Ind.

I claim, 1st, The disk, M, and pins, N, on the shaft of the escapement wheel of the time-keeping movement, for controlling and regulating the action of the advertising mechanism, substantially as and for the purpose set forth.

2d, The pawl, O, on any suitable part of the advertising mechanism, in combination with the disk, M, and pins, N, as and for the purpose set forth.

3d, The rods, L, or their equivalents, attached to the advertising band, B, as and for the purpose set forth.

4th, The catch, K, and flexible arm, l, attached to the reciprocating rod, F, arranged and operating as and for the purpose set forth.

5th, The rods, L, in combination with spring-catch, P, and catch, K, arranged and operating substantially as set forth.

74,705.—BLACKING CASE AND CLOSET.—Jas. Macferran (assignor to himself and Samuel Macferran), Philadelphia, Pa.

I claim, 1st, The sectional folding lid, C, provided with a foot-rest and combined with the stationary part, B, of the cover of the box, substantially in the manner above described, and for the purpose specified.

2d, The slide, D, when combined with the stationary and folding parts, B and C, of the cover of the box, substantially as and for the purpose set forth.

3d, The combination of the hinged part, A, containing the boot-blacking apparatus, with the lower part, A', composing the water closet, furnished with the perforated division, F, and door, J, substantially as described and for the purpose set forth.

74,706.—LOW-WATER DETECTOR FOR STEAM GENERATOR.—G. B. Massey, New York city.

I claim, 1st, The movable vessel, G, connected with a steam boiler or other vessel in which steam is generated, and with the oscillating lever or sway bar, E, substantially as and for the purposes shown and described.

2d, The lever or sway bar, E, supported from a variable fulcrum or center, and connected with and operating upon the vessel, G, substantially as set forth for the purposes specified.

74,707.—SHOE.—D. S. McNamara, Troy, N. Y.

I claim a shoe provided with the elastic strips, d d and c, as herein specified and for the purpose set forth.

74,708.—SODA FOUNTAIN.—J. W. Milroy, J. Vaughn, and J. Turley, Galveston, Ind.

We claim the construction and arrangement of the fountain, A, lid, G, cylinder C, in combination with the pump cylinder, D, as arranged with the valve box, c, and discharge tube, C, and valves, d d, substantially in the manner and for the purpose as herein described and shown.

74,709.—BEEHIVE.—N. C. Mitchell, Caledonia, Ohio.

I claim, 1st, Hinging the frames, K K, to the moth box, and over the screen, I, in such a manner that the offal will pass into said box, and the frames may be drawn out of the hive, substantially as and for the purpose set forth.

2d, The moth-box, D, constructed in the manner described, with three openings, one for bees, and two for millers, when used with the movable comb-frames and the hive, A, as and for the purpose set forth.

74,710.—CORN PLANTER.—Josephus Moore, Bushnell, Ill.

I claim, 1st, The arrangement of the shaft, D, with the seed hoppers, F F, covers, G G, valves, N, discharge spout, O, and runners, P, constructed and operating in the manner and for the purpose set forth.

2d, The arrangement of the plate, W, shaft, M, wheel, L, collar, J, and bevel wheel, K, with the shaft, D, as and for the purpose set forth.

74,711.—CORN PLANTER.—William H. Moore, Blooming Grove, Ind.

I claim, 1st, The arrangement in a corn planter of the seed-dropping device consisting of the elements O o P Q q R r and S, substantially as and for the purpose set forth.

2d, The pivoted frame, H I I' I'' I''' K K' K'' K''' k, arranged to be raised from the ground by means of chain, Y, lever, l, and ratchet, 3, substantially as stated.

74,712.—BREECH-LOADING FIRE-ARM.—Wm. Morganstern, Philadelphia, Pa., assignor to E. Von Jeinsen, New York city.

I claim, 1st, The angular point, o, in the interior of the breech block, in combination with the hammer, d, substantially as described.

2d, The spring block, q, in combination with the hammer, d, substantially as described.

3d, The hollow curves, m n, before and behind the angular point, o, substantially as described.

4th, The hooked arm, g, forming part of the sere, and operated by it, and arm being arranged to work in a recess formed in the receiver, b, and by means of its hook to engage the breech block on its rear side, substantially as described.

5th, Locking the breech block before firing by the combined action of the hammer and the projector, O, and also locking it after firing by the combined action of the hammer and the straight side of said block forward of the hollowed part, m, substantially as described.

74,713.—CLOTHESLINE CLAMP.—G. R. Nebinger, Lewisberry, Pa., assignor to himself and Wm. A. Middleton.

I claim the block, B, having a horizontal groove in its center, whereby two flanges are formed, which have each a vertical slot, x, on their inner sides, when used in combination with the wedge-shaped block, C, provided with trunnions, e e, which work in said slots, as and for the purposes specified.

74,714.—SPINNING JACK.—Thos Netherwood and J. P. Babcock, Westerly, R. I.

We claim, 1st, The arrangement of the shaft, I, with pendant arm, f and curved cam, E, weight, F, rod, g, and spring rod, i, for operating the shipper-board, G, in the manner substantially as specified.

2d, The arrangement of the rods, d d2, pin, d, and knee board, B, on the car, A, in combination with the latch, a, and rod, D, in the manner and for the purposes set forth.

74715.—CLOTHES DRYER.—W. B. Noyes, Dorchester, N. H.

I claim, 1st, The wheel, A, furnished with slot, c, and opening, e, in the manner and for the purpose substantially as set forth.

2d, The wheel, A, in combination with wheel, g, when constructed and arranged substantially as described.

3d, The wheels, A and g, and arms, f f, in combination with slide, m, the whole constructed and operating as described.

74,716.—GATE.—Oliver Perry and Clark Perry, Ortonville, Mich.

We claim the combination of the gate, as constructed, stationary arms, C D and E, and cords, K L, all operating as set forth.

74,717.—APPARATUS FOR CONVEYING SCREW BLANKS.—E. S. Pierce, Hartford, Conn.

I claim, 1st, The swinging arm, B, in combination with the griping lever, C, when the same are constructed, operated, and governed in the manner described.

2d, The combination of the slide, I, the arm, B, and the spring, H, or its equivalent, when used in the manner and for the purpose herein specified.

3d, The subject matter of the first claim, in combination with the freeding trough, A, substantially as described.

4th, The combination of the feeding trough, A, the slide, I, and the conveying arms, B, substantially as described.

5th, The combination of the feeding trough, A, the conveying arm, B, the griping lever, C, and the pawl, E, substantially as described.

6th, I claim the combination of the feeding trough, the slide, I, the arm, B, the lever, C, and the pawl, E, substantially as described.

74,718.—WINDOWSASH FASTENER.—Isaac Pierson, Hartford, Conn.

I claim a window fastener consisting of one piece of metal, of such a form that one part enters the upper sash and secures the sashes from being slipped past each other, and the other part turns over to one side and hooks into the lower sash, substantially as described, to prevent the first-mentioned part from being withdrawn.

74,719.—GRAIN WEIGHING MACHINE.—Henry Pooley, Henry Pooley, Jr., Thomas Roberts and Louis Luc, Liverpool, England.

We claim, 1st, The construction and use of twin scales placed side by side, when operated by devices substantially in the manner and for the purpose hereinbefore described and set forth.

2d, The combination of the swivelling inclined spout into which the grain or other material to be weighed falls from the store or hopper and the stationary double spout which guides the grain or material to be weighed into the scales, substantially as shown and described.

3d, The alternative mode of accomplishing the same purposes by means of the rocking double-throated feed spout hinged underneath a hopper, substantially in the manner and for the purposes hereinbefore set forth.

4th, The inverted T-lever and its balanced catches on the end of the rocking shaft, which directs and controls the momentum of the apparatus originated by the loaded scales, in the manner and for the purposes hereinbefore described and set forth.

5th, The construction and use of the rocking shaft and its appendages as the means of distributing the continuous flow of grain or other material to the scales, and for the other purposes hereinbefore described and set forth.

6th, The construction and use of the double-actian tumbling hammer for disengaging each scale alternately after it has received the full load and also the peculiar locking apparatus connected therewithand the mode of tilting the scales, as hereinbefore described and set forth.

Lastly, the arrangement and combination of the several parts forming together the double self-acting and self-registering apparatus for weighing a continuous flow of grain or other material, all as hereinbefore described and set forth.

74,720.—PEN.—E. L. Pratt, Boston, Mass.

I claim, as a new article of manufacture, a fountain or reservoir designed for use in combination with a pen when made with a perforation, c, a band, a, and corrugations, 1 2 3, all arranged substantially as and for the purpose described.

74,721.—SHOVEL PLOW AND CULTIVATOR.—B. F. Ream, Ada, Ohio.

I claim the gage beam, E, constructed substantially as described in combination with the beams, A and a, guide bar, G, shovels or plows, C C', or any of them, and colter, D, substantially as and for the purposes set forth.

74,722.—BUTTER DISH.—Ira A. Richards, Brookfield, Mass.

I claim the cap, E, hinged at a point, d, above the center of the bearing and the said cap provided with a nose, g, so as to spring down over the point, f, and secure the trunnion of the cover in its bearing, substantially as set forth.

74,723.—TRUNK.—Edward Semple, Chicago, Ill.

I claim the angle pieces, A, provided with the loops, a, in combination with the angle pieces, C, provided with the lugs, b, when arranged for operation in connection with a trunk or similar article, substantially as described.

74,724.—SPACING AND BORING MACHINE.—James M. Seymour, Newark, N. J.

I claim, 1st, The combination of the bell crank, s, for moving the slide, x, and the adjustable stops, n n and i, so arranged that the action of said crank shall move the slide as soon as the bit is raised out of the wood, when operated substantially in the manner set forth.

2d, The arrangement of the fence, y, slide, x, and removable notched stick, p, and reciprocating pawl, u, constructed and operated substantially as and for the purpose set forth.

74,725.—CLAMP FOR TRUSSING CYLINDERS OF STAVES.—Walter Shepperman, Pittsburg, Pa.

I claim the crosshead, A, provided with rollers, e e, in combination with screw, C, block, D, and cord, g, substantially in the manner herein set forth and described.

74,726.—CORN SHELLER.—E. F. Sherman, Chicopee, Mass.

I claim, 1st, The combination of a shelling cylinder having ridges placed obliquely as described with the adjustable toothed bonnet, the whole arranged and operating substantially as set forth.

2d, The flanges, k k, in combination with the obliquely-placed ridges of a corn sheller, substantially as and for the purpose set forth.

3d, Reversing the position of each alternate lay of ridges on the cylinder of a corn sheller, substantially as and for the purposes set forth.

4th, The V-shaped ridges, placed on the cylinder of a corn sheller in such a manner that in each separate lay their V-points shall approach the center of the periphery of the cylinder while the V arms diverge from the center in opposite directions, substantially as and for the purposes described.

74,727.—BINDING GUIDE FOR SEWING MACHINES.—Lyman C. Session, Neenah, Wis.

I claim a binding guide consisting of the pieces, A B C, and set screw, E, all constructed, arranged and operating as and for the purpose set forth.

74,728.—PENCIL SHARPENER.—O. C. Squyer, Penn Yan, N. Y.

I claim the screw, C, in combination with the pencil sharpener, substantially as and for the purpose set forth.

74,729.—PLOW.—Stephen W. Standart, Bellevue, Ohio.

I claim the arrangement of the land-side bar, D, movable mold board, E provided with metal knife and its bottom, bars, F, bar, H, and roller, operated by the lever, I, the whole combined and used with the plow beam, in the manner and for the purpose set forth.

74,730.—MACHINE FOR GRINDING THE CUTTERS OF HARVESTING MACHINES.—William H. Stevenson, Auburn, N. Y.

I claim, 1st, The combination, substantially as described, of the U-shaped frame, A, and the V-shaped bearings, D D', with the grindstone mounted on the overhanging shaft, for the purposes set forth.

2d, The oscillating clamping frame or holding rack, H, operating substantially as described.

3d, The combination substantially as described with the oscillating clamp bar of the adjustable supports, L l, for the purpose set forth.

4th, The combination, substantially as described, of a grindstone mounted on one end of an overhanging shaft with a vertically, laterally and longitudinally adjustable swinging clamping bar, for the purposes set forth.

5th, The combination, substantially as described, of the clamping bar, H, adjustable clamps, K, radius bars and set screws, l, for the purpose set forth.

6th, The U-shaped frame, A, constructed as described.

74,731.—MACHINE FOR GRINDING THE CUTTERS OF HARVESTING MACHINES.—William H. Stevenson, Auburn, N. Y.

I claim, 1st, The grindstone, constructed as described, with one part of its periphery bevelled and the other part parallel to the axis of rotation and having an annular groove in that side next the parallel surface, for the purposes set forth.

2d, The combination, substantially as described, of the bench, A, the overhanging detachable frame or bed, B, the stone and the spindle, E, for the purposes set forth.

3d, The combination, substantially as described, of the stone, the spindle, and the oscillating rack bar or clamp frame, whereby I am enabled to grind the knives with their points down.

74,732.—VIBRATING LEVER POWER.—Nicholas Tripp, Niagara Falls, N. Y.

I claim the duplicate sets of pendulum levers, C C, weighted at a, the duplicate fly plates, I I, armed with balls, h h, and connected by arms i i, and boxes, l l, with the double crank shaft, K, the adjusting ball, s, and the double-acting levers, D D, receiving motion by cog segments, b c, and transmitting motion to the one crank shaft, F, the whole constructed and arranged as described and operating in the manner and for the purpose herein set forth.

74,733.—PRESERVING EGGS.—Aaron Van Camp, Washington, D. C.

I claim, 1st, The process herein described for preserving eggs.

2d, The use of chloride of calcium, or its equivalent, for the purpose of preserving eggs.

3d, Phosphoric acid as material for preserving eggs.

4th, The combination of the ingredients herein mentioned for preserving eggs.

74,734.—LEATHER SPLITTING MACHINE.—Francis J. Vittum, Newburyport, Mass., assignor to W. N. Ely, Stratford, Conn.

I claim, 1st, The long belt knife cutting either way, substantially as described.

2d, The knife coiled on drums and operating either way, substantially as described.

2d, The compound roller with spindle, spiral spring and sectional rings, substantially as described.

4th, The compound roller, as described, in combination with a rubber roller, substantially as described.

5th, The compound roller, as described, in combination with a splitting knife, substantially as described.

6th, The cam or projection on the back of the knife, substantially as and for the purpose described.

7th, Arranging and operating the knife by means substantially as described.

74,735.—FEED WATER HEATER OF STEAM GENERATORS.—Horatio N. Waters (assignor to himself and Newton Case), Hartford, Ct.

I claim, 1st, The device, I J, for the purpose of preventing the water in the reservoir from being drawn down to the level of the orifice of the feed pipe, substantially as herein specified.

2d, I claim the combination of the devices, A B C D E F G H I and J, for the purposes of a heater for steam boilers, substantially as specified.

3d, I claim the combination of the devices, C D E and F, substantially as herein described.

74,736.—PREPARING HEMP AND FLAX FIBER FOR THE MANUFACTURE OF DUSTERS, ETC.—Edmund G. Wayman (assignor to Robert V. Snodgrass), Louisville, Ky.

I claim the preparation and application of hemp and flax fiber in the production of a duster, the preparation and manufacture to take place as herein described, or any other substantially the same, and which will produce the intended effect or the same results.

74,737.—BREECH-LOADING FIRE-ARM.—Josef Werndl, Steyer, Austria.

I claim, 1st, The oscillating cylindrical breech block provided with a recess or groove for admitting the cartridge into the chamber of the barrel and moved forward by an oblique or spiral shoulder on its base pin, when constructed and operating substantially as described.

2d, The combination of the barrel, a, the hollow cylinder, b, the locking cylinder, c, the firing pin f, the groove, g, the ejecting lever, h p, the axis, k, with its squared end, the spring, s, and the sliding breech block, l, with its inclined surface, m, the whole being constructed and arranged substantially as described, for the purpose of a breech loading fire-arm.

74,738.—PUMP FOR DEEP WELLS.—James T. Whipple, Chicago, Ill.

I claim cylinder, B, provided with valves, e and e'', when so constructed as to be capable of being adjusted to any given point within the main pipe, in combination with ring, D, disk, C, and provided with packing, L, whereby a water-tight joint may be obtained between the cylinder and the sides of the main pipe, substantially as and for the purpose set forth.

74,739.—MORTISING MACHINE.—L. W. Wolfe, Jacksonville, Ill..

I claim the sliding saw frame, K, having arms, I I, as specified, whereby motion is communicated to the mortiser, N, through the connecting rod, P, and lever, O, all constructed and operating as specified.

74,740.—DEVICE FOR TEACHING COMMERCIAL TRANSACTIONS.—C. A. Walworth, Utica, N. Y.

I claim the drawer or apparatus, substantially such as herein described, for the purpose of teaching and practically illustrating commercial transactions as described.

74,741.—COLORED PRINTING PRESS.—George W. Wood (assignor to himself and James W. Slater), Richmond, Ind.

I claim, 1st, The adjustable segmental plates, A, for transferring the ink from the distributing to the type rollers, attached to a center, B, and used in combination with intermediate adjustable reglets, or their equivalents, substantially in the manner set forth.

2d, The combination of the distributing rollers, the segmental plates, A, and the type rollers, substantially as set forth.

3d, The combination of the rollers, I and K, and their adjustable boxes, F F2, substantially as set forth.

4th, So arranging the rollers, I and K, and the plates, A, that while the work of distribution on the rollers goes on continuously, the roller, I, shall, by the oscillation of its bearings be brought in contact only with its appropriate set of transferring plates, and be removed while the other sets are passing, substantially as set forth.

## REISSUES.

2,859.—MANUFACTURE OF METALLIC SQUARE.—Samuel Darling, Bangor, Me. Patented Oct. 6, 1857

I claim, 1st, A hardened-edged tongue, united by soldering to a beam, constructed substantially as described.

2d, A tongue for squares, which is hardened at the edges and soft in the center, substantially as described.

3d, The mode or process described of hardening the edges of the tongue by pressure between plates of cold iron.

4th, The mode or process described of hardening the edges of the tongue by confining it between pieces of iron, and then heating and tempering, as described.

2,870.—MACHINE FOR WEIGHING AND BAGGING GRAIN.—Harriet M. Fish, New York city, assignee of L. K. Plimpton, and William Foot, executors of James M. Fish, deceased. Patented June 5, 1860.

I claim, 1st, The hopper, A A, fitted with a sloping bottom, and with a bagging spout or spouts, and gate or gates, on the side or sides of said hopper, to regulate the flow of grain, substantially as described.

2d, The use of said hopper, so fitted with sloping bottom, spouts and gates, in combination with a weighing scale, substantially as described.

2,871.—RAKE FOR HARVESTER.—Andrew J. Holman, Philadelphia, Pa., assignee by mesne assignments, of Isaac Van Doren. Patented Sept. 22, 1857.

I claim, 1st, The combination of the platform of a hinged bar harvester with a rake mounted thereon, and discharging the grain automatically upon the ground, out of the way of the machine and horses on the next round.

2d, The combination of an automatic rake, discharging upon the ground, with the platform of a hinged bar harvester, which is suspended from the main frame.

3d, The combination of an automatic rake, with the platform of a harvester, having an adjustable, suspended, hinged finger beam.

2,872.—HEAD BLOCK FOR SAW MILL.—Dennis Lane, Montpelier, Vt. Patented July 9, 1861.

I claim, 1st, The employment or use of the ratchets, H I J K having teeth at different distances apart, in connection with the adjustable dog, P, placed on the rod, O, which is provided with retaining pins, h, the ratchets being placed on the shaft, F, having pinions, G G, at its ends, which gear into racks D D, attached to bar, C, all being arranged as and for the purpose set forth.

2d, The bar, C, provided with supports, A2, dogs, l l, on fixed posts, k k dogs, e e, and lever cams, f, when the parts are constructed and arranged relatively with each other, and operated in the manner and for the purposes substantially as described.

2,873.—CONSTRUCTION OF BOATS.—Abram Van Order, Ithaca, N. Y. Patented Sept. 10, 1861.

I claim, 1st, The construction of the described layers of wood, placed one above the other, making the shell or sides and ends of the boat, the described method of spiking or bolting the said layers together, and the cross rod bracing, connecting the bilge timbers with the gunwale timbers, when arranged in relation to each other substantially as and for the purposes described.

2d, Constructing the sides and ends of boats wholly of horizontal layers of timbers, bolted or spiked one upon the other, substantially in the manner and for the purposes set forth.

3d, The construction of a bilge or bottom frame, of solid timber, in whole or in part, about the bottom of a boat, when the floor timbers are attached thereunto, as described, and for the purposes specified.

4th, The arrangement and construction of the bottom planking on the floor timbers within, and protected by the bilge frame, as set forth.

5th, The floor timbers, dovetailed to the bilge timbers, on their inner side and top, and held in place by the horizontal layers on their ends, for strength and security against accidents, as set forth.

6th, Constructing the sides and ends of boats of layers of horizontal timbers, bolted or spiked one upon the other, and upon the bilge frame, and upwards from it, substantially as and for the purposes described.

## DESIGNS.

2,935.—HAT RACK.—H. P. Conant, Boston, Mass.

2,936.—FRUIT JAR.—Thomas Houghton, Philadelphia, Pa.

2,937.—INKSTAND, SPONGE CUP, AND PEN RACK.—Thomas S. Hudson, East Cambridge, Mass.

2,938.—FLOOR OIL CLOTH PATTERN.—Albert E. Powers, Lansingburg, N. Y., assignor to D Powers & Sons.

2,939.—FLOOR CLOTH PATTERN.—Albert E. Powers (assignor to D. Powers & Sons), Lansingburg, N. Y.

## PENDING APPLICATIONS FOR REISSUES.

*Application has been made to the Commissioner of Patents for the Reissue of the following Patents, with new claims as subjoined. Parties who desire to oppose the grant of any of these reissues should immediately address* MUNN & Co., 37 *Park Row, N. Y.*

70,806.—SILENT BOLT FEEDER.—Jacob Cornwell (assignor to himself, D. B. Merrill and Wm. H. McCourtie), Kalamazoo, Mich. Dated Nov. 12, 1867. Application for reissue received and filed Feb. 4, 1868.

1st, I claim, in combination with the hoop, H, or its equivalent, for holding the flour, the revolving platform, m, operating substantially as and for the purpose set forth.

2d, I claim providing the revolving platform, M, with the strip or float, f, or its equivalent, for the purpose of sweeping the flour into the spout, I, substantially as described.

3d, I claim the sleeve, S, in combination with the hoop, H, and revolving platform, m, when constructed and operating substantially as herein described.

43,376.—SUGAR MOLD.—Theodore A. Havemeyer, J. Lawrence Elder and Charles K. Loosey, New York city, assignees of Carl Kronig, Vienna, Austria. Dated June 28, 1864. Application for reissue received and filed Feb. 6, 1868.

I claim the process substantially as herein described for making vessels and other articles which process consists in saturating with linseed, or equivalent oil, vessels or articles made of paper, or equivalent substance, in manner substantially as described.

And I also claim coating articles which have been made as herein described and which have been saturated with oil with a paste of red lead and oil and then varnishing the same, substantially as described.

69,151.—JUG TOP.—Homer Wright, Henry H. Collins and Benjamin C. Collins, Pittsburgh, Pa., assignees of Homer Wright, aforesaid. Dated Sept. 24, 1867. Application for reissue received and filed Jan. 28, 1868.

1st, I claim the flange, S, when made as and for the purpose shown.

2d, The hinge and knob combined in one piece, as specified.

3d, The lid when made to cover entirely the top rim of the body, as set forth.

4th, The opening, H, in the lid when used in combination with the hinge and knob piece, as described.

5th, The convex bulge, P, or its equivalent, when used for the purpose indicated.

6th, Hinging the lid so as to rotate from the inside of the body, as described.

70,523.—APPARATUS FOR RAISING AND SECURING THE LEGS OF HORSES TO SHOE THEM.—J. P. Champion, Phillips, N. Y. Dated Nov. 5, 1867. Applicat on for reissue received and filed Jan. 29, 1868.

I claim the lever apparatus for raising and securing horses' legs employed in connection with a suitable frame, arranged and applied substantially as herein shown and described.

10,038.—MACHINE FOR GRINDING PLOW CASTINGS.—Joshua Gibbs, Canton, Ohio, Dated Oct. 4, 1853. Extended Sept. 27, 1857. Application for reissue received and filed Jan. 23, 1868.

1st, I claim a frame or carriage which is capable of a lateral, longitudinal and oscillating adjustment in combination with a grindstone or polishing wheel for grinding and polishing plane and irregular surfaces, substantially as set forth.

2d, The table or stand, H, or its equivalent, in combination with a frame or carriage having a lateral, longitudinal and oscillating adjustment and with a grindstone or polishing wheel, as and for the purpose set forth.

3d, The rope, g, provided with a weight, or its equivalent, at one end in combination with an adjustable carriage for holding work to a grindstone or polishing wheel, substantially as set forth.

62,724.—DUSTING BRUSH.—J. O. Adams and E. A. Warfield (assignees of Robert H Aldrich), Northampton, Mass. Dated March 12, 1867. Application for reissue received and filed Jan. 30, 1868.

I claim a brush made of sheepskin with the wool on, cut into strips and fastened over one or more central cores, substantially as herein shown.

36,017.—HARVESTER.—Cyrus Newhall, Hinsdale, N. H. Dated July 29, 1862. Application for reissue received and filed January 24, 1868.

5th, I claim the combination in a harvester of a laterally projecting finger beam with cutters driven by a pitman passing through the driving wheel

☞ NOTE.—*The above claims for Reissue are now pending before the Patent Office and will not be officially passed upon until the expiration of* 30 *days from the date of filing the application. All persons who desire to oppose the grant of any of these claims should make immediate application.* MUNN & CO., *Solicitors of Patents,* 37 *Park Row, N. Y.*

## Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

### PROVISIONAL PROTECTION FOR SIX MONTHS.

2.—FIRE AND BURGLAR PROOF SAFE.—Benj. Sherwood and Daniel Fitzgerald, New York city. Jan. 1, 1868.

18.—CHURN.—Milton A. Hamilton, Detroit, Mich. Jan. 2, 1868.

31.—CONVERTING POWER AND SPEED, AND MULTIPLYING AND TRANSMITTING MOTION.—Wm. F. Goodwin, East New York, N. Y. Jan. 4, 1868.

59.—COMBINING WROUGHT AND CAST IRON, ETC.—Wm. M. Arnold, New York city. Jan. 7, 1868.

48.—PROCESS FOR REMOVING SULPHUR, PHOSPHORUS, ETC., FROM IRON STEEL, AND OTHER METALS.—John F. Bennett, Pittsburg, Pa. Jan. 7, 1868.

52.—CONNECTING THE ENDS OF METALLIC COTTON BALE TIES.—James Maury, New Orleans, La. Jan. 7, 1868.

56.—CONNECTING THE ENDS OF METALLIC COTTON BALE TIES.—Joseph B. Dunn, Petersburg, Va. Jan. 7. 1868.

79.—MODE OF PROPELLING VESSELS.—Charles M. O'Hara, New York city. Jan. 8, 1868.

84.—CUTTERS FOR FORMING WOOD MOLDINGS, ETC.—John Whitworth, William Whitworth, and Alexander B. Halliwell, Cleveland, O. Jan. 8, 1868.

98.—APPARATUS FOR SEWING BOOKS FOR BINDING.—Henry G. Thompson, New York city. Jan. 10, 1868.

109.—MACHINERY FOR SIZING THE BACKS OF CARPETS, ETC.—Henry G Thompson, New York city. Jan. 11, 1868.

123.—SPIRIT LEVEL.—H. G. Julian, New York city. Jan. 14, 1868.

131.—COMPOSITION FOR FURNACE LININGS, FIRE BRICKS, ETC.—George Nimmo, Jersey City, N. J. Jan. 15, 1868.

151.—FRUIT BASKET.—Welcome Hitchcock, New York city. Jan. 16, 1868.

158.—NAIL AND TACK MACHINERY.—John H Geary, Fairhaven, Mass. Jan. 17, 1868.

169.—TREATING WOOD VENEER AND FORMING THEREFROM SHEETS AND CARDS.—Dawson Miles, Boston, Mass. Jan. 17, 1868.

170.—HAY CUTTER.—Geo. S. Fisher, Buffalo, N. Y. Jan. 17, 1868.

172.—MACHINERY FOR PROPELLING VESSELS.—Andrew J. Reynolds, Sturgis, Mich. Jan. 18, 1868.

187.—LINKSOR COUPLINGS FOR HARNESSES, ETC.—Geo. S. Fisher, Buffalo, N. Y. Jan. 18, 1868.

200.—SHIPS FOR TRANSPORTING OILS, ETC., ALSO SUPPLYING THE SAME AS FUEL TO FURNACES OF STEAMSHIPS, ALSO BALLASTING SHIPS WITH WATER. John H. Smith, Allegheny City, and Elbridge G. Benedict, Southwest, Pa Jan. 20, 1868.

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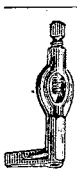

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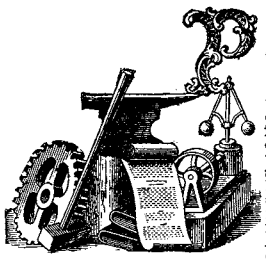

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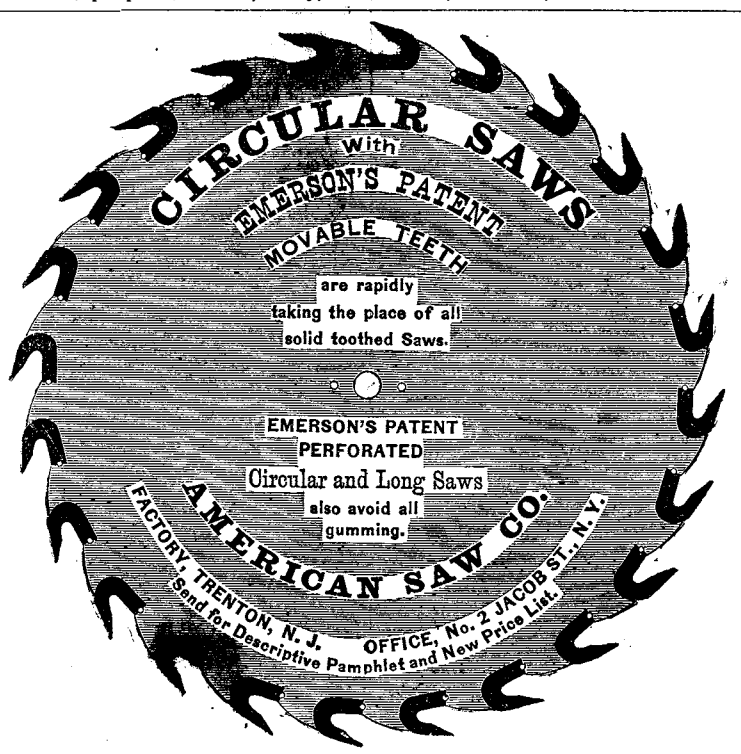


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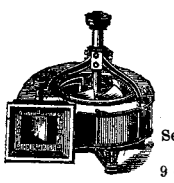

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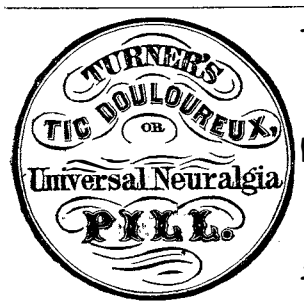


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